NOBLELIFT

CE

Operation Manual

A series 2.0-3.8t IC forklift truck

NOBLELIFT EQUIPMENT CO.,LTD

11/2024

293346020003

Foreword

A series 2.0-3.8t internal combustion counterweight forklift is a product independently developed by our company. The product has the characteristics of small turning radius, beautiful shape, compact structure, small volume, low center of gravity, good stability and superior performance.

This manual is about the correct use of A series 2.0-3.8t internal combustion counterweight forklift instructions, guide you to safe operation and preventive maintenance, and help operators use the internal combustion forklift reasonably, so that the maximum efficiency of the internal combustion forklift! Relevant operators and maintenance personnel, be sure to read this manual before use. This manual includes National III, National IV (X1/X2/Q1) emission vehicle models. This manual is also applicable to container forklifts and forklifts equipped with accessories. Only trained and qualified personnel are allowed to service forklifts.

As our products continue to be updated and improved, you may have a product that is slightly different from some of the descriptions in this manual. If there is any confusion, please contact Nori Group sales company or agents.

This manual briefly introduces the technical parameters of our company's counterweight forklift, the structure, working principle of each main component, and the requirements and contents of operation, maintenance and maintenance. Please strictly abide by the provisions and precautions in this manual, careful driving, careful operation, careful use, so that your forklift truck in the best working condition for a long time, play the maximum efficiency. When you rent or transfer the forklift, please rent or transfer this manual with the vehicle.

In order to stand out, this manual USES the following icon:

1.  ---- Indicates a potentially hazardous condition that, if not avoided, could result in serious injury to the person, serious damage to the vehicle, or fire.

2.  ---- Indicates a potentially hazardous condition that, if not avoided, may result in minor to minor injury to the human body or partial damage to the vehicle.

3.  ---- General precautions and instructions when using.

 Most of this product is made of recyclable steel, and the waste generated in the process of use, maintenance, cleaning and disassembly must be recycled and disposed of pollution-free in accordance with local regulations. The recycling of these wastes must be done by professionals in designated areas, such as hydraulic oil, batteries and electronic equipment waste, if not properly disposed of, can cause harm to the environment and human health. The product recall service shall be implemented in case of batch problems.

Directory

Vehicle overall Introduction

Ⅰ、Requirements of the vehicle use environment:

This vehicle is a special motor vehicle used only in the factory area, warehouse, freight yard and other specific areas specified in the Regulations on Special Equipment Safety Supervision.

1）This product is strictly prohibited for use in potentially explosive environments.

2）Environmental working conditions:

Average ambient temperature under continuous operating conditions:40℃;

Maximum ambient temperature in the short term (not more than 4h) :45℃;

Minimum ambient temperature when using forklift under normal conditions:-20℃;

Altitude: No more than 2000 meters.

If you need to use in high, low temperature and other special environment, need to install special accessories, please contact our relevant personnel.

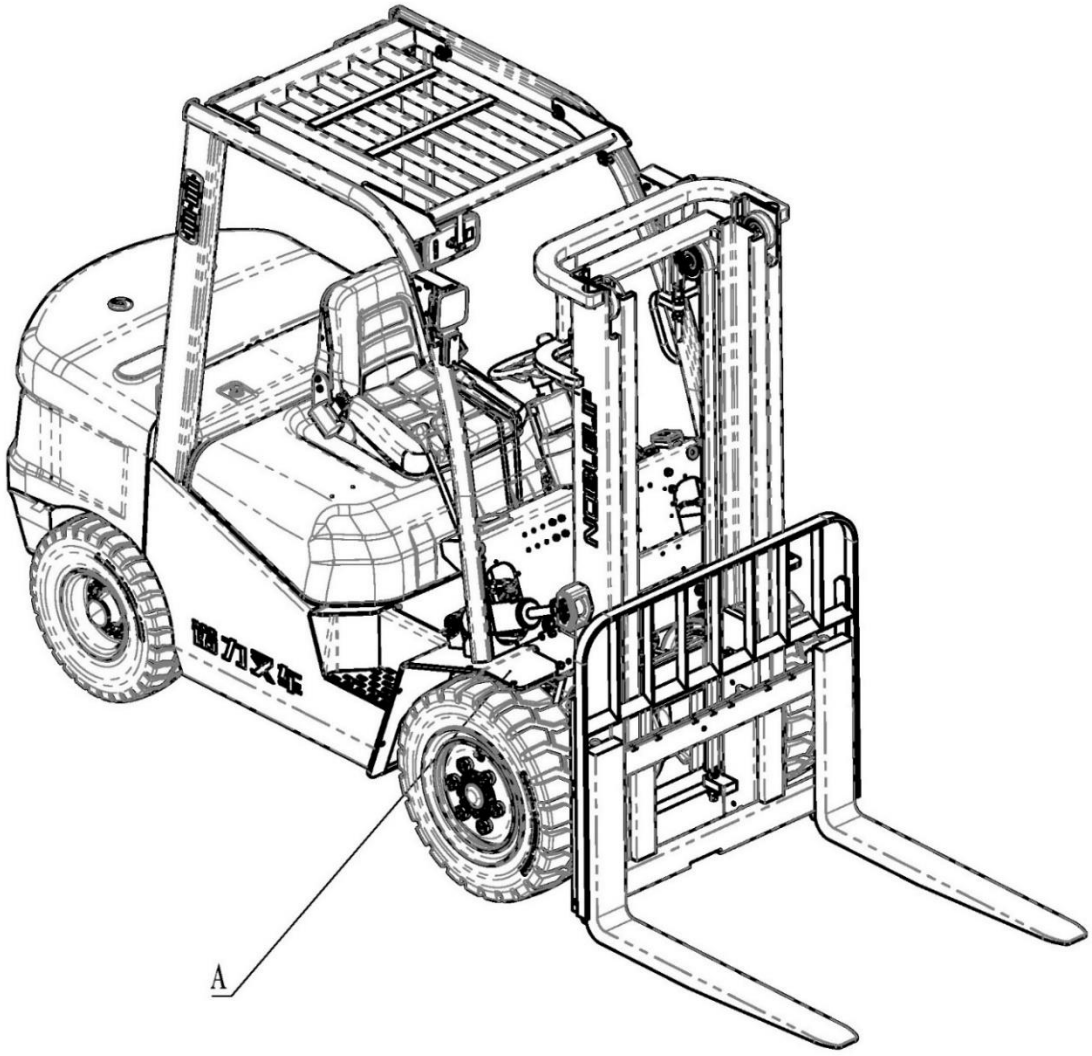
Ⅱ、Vehicle safety monitoring device

The forklift meets TSG 81-2022 safety monitoring requirements. Driver permission information collector has been installed, through the fingerprint, iris, face features and other biological information or magnetic card and personal identity unique binding media price, verify the driver's operation authority, when the collector fails, dismantled or driver information is incorrect, the vehicle can not start.

The electro-hydraulic reversing (electronic file) forklift is equipped with the seat switch and the gantry lowering solenoid valve, and the driver is not in the correct operating position, so the vehicle cannot walk and the gantry cannot move.

Ⅲ、Frame number location

The vehicle is provided with a unique frame number, and it is strictly prohibited to alter or destroy it intentionally. If there is any damage, please contact the relevant special equipment management department or agent in time.

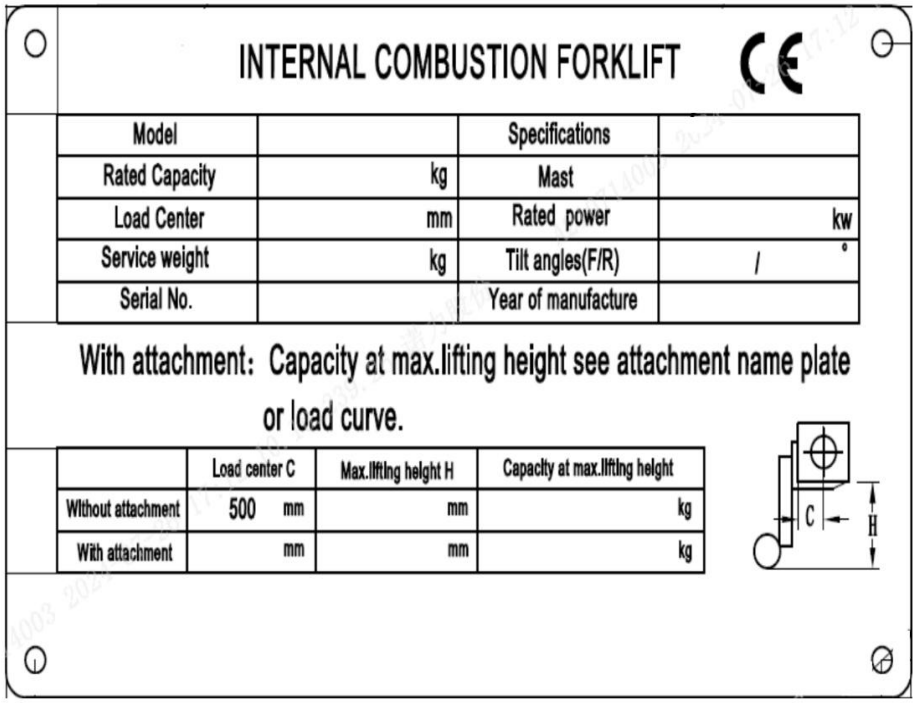


Icon 1-1

Frame number：XXXXXXXXX

Frame number：A（No case and no tools）

IV、Machine nameplate information



INTERNAL COMBUSTION FORKLIFT CE

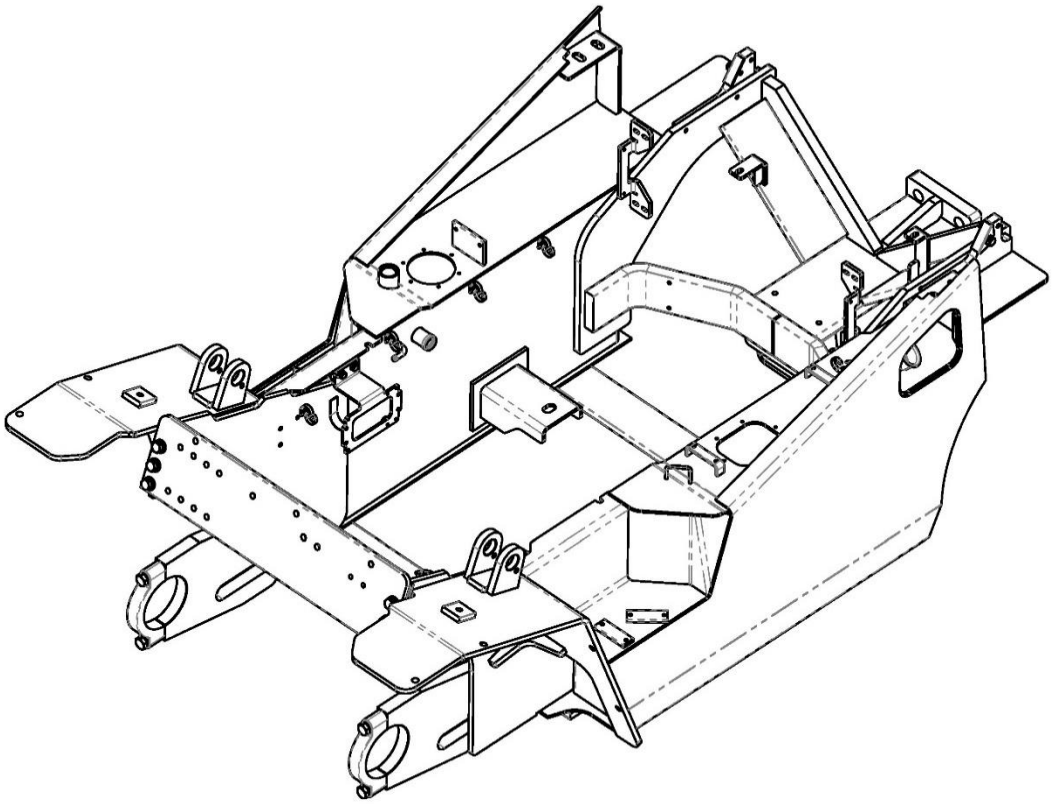
Model		Specifications	
Rated Capacity	kg	Mast	
Load Center	mm	Rated power	kw
Service weight	kg	Tilt angles(F/R)	/ °
Serial No.		Year of manufacture	

With attachment: Capacity at max.lifting height see attachment name plate or load curve.

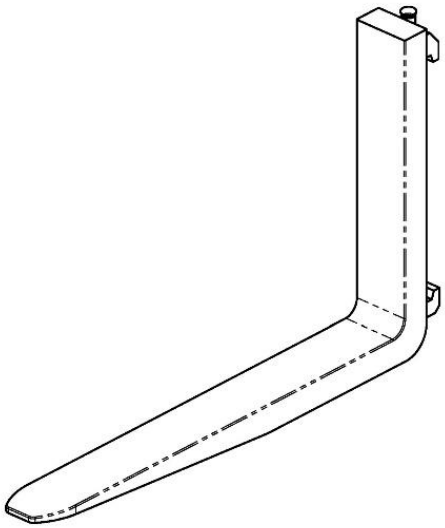
	Load center C	Max.lifting height H	Capacity at max.lifting height
Without attachment	500 mm	mm	kg
With attachment	mm	mm	kg

Ⅴ、Structural drawing of main force components

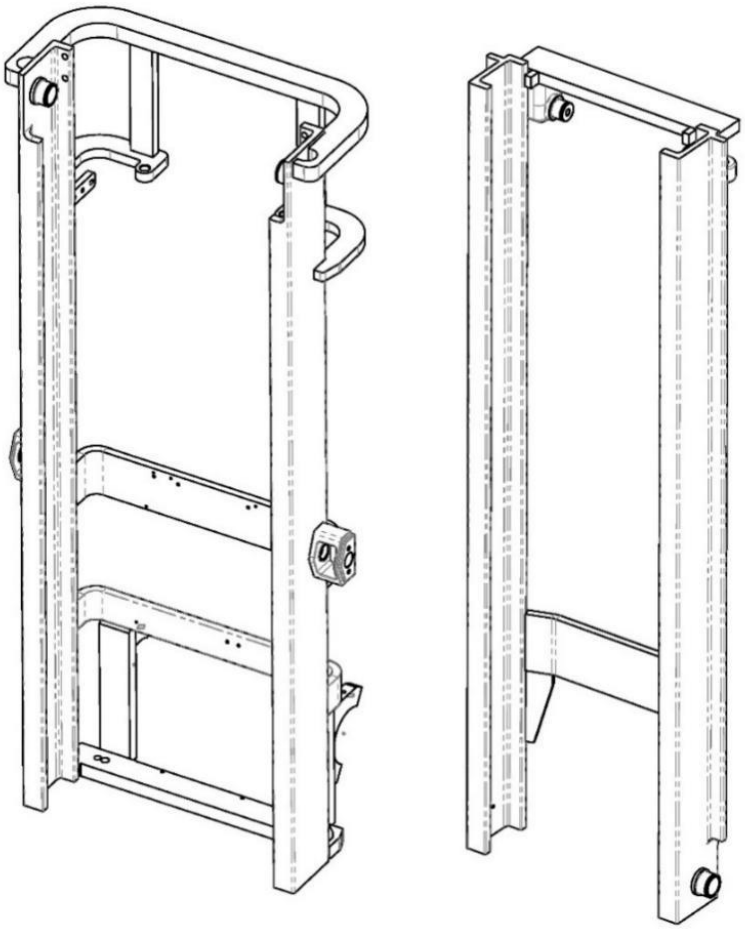
2t/2.5t/3t/3.5t/3.8t Internal combustion counterweight forklift truck main stress structure Comply with TSG81-2022 regulations



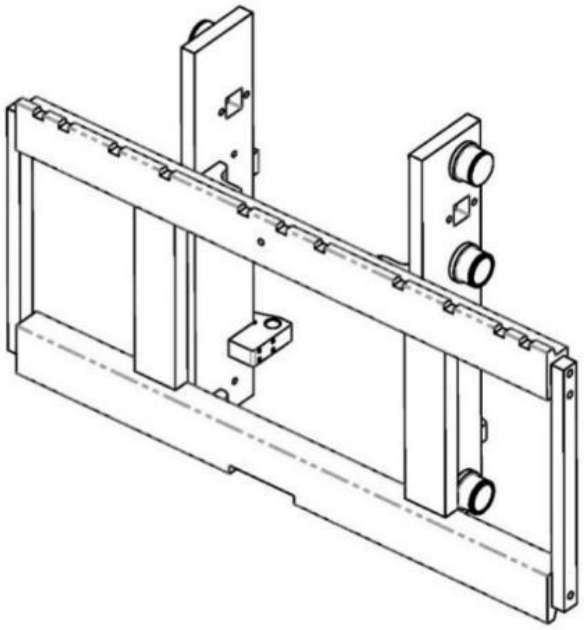
Icon 1-2 The frame



Icon 1-3 fork



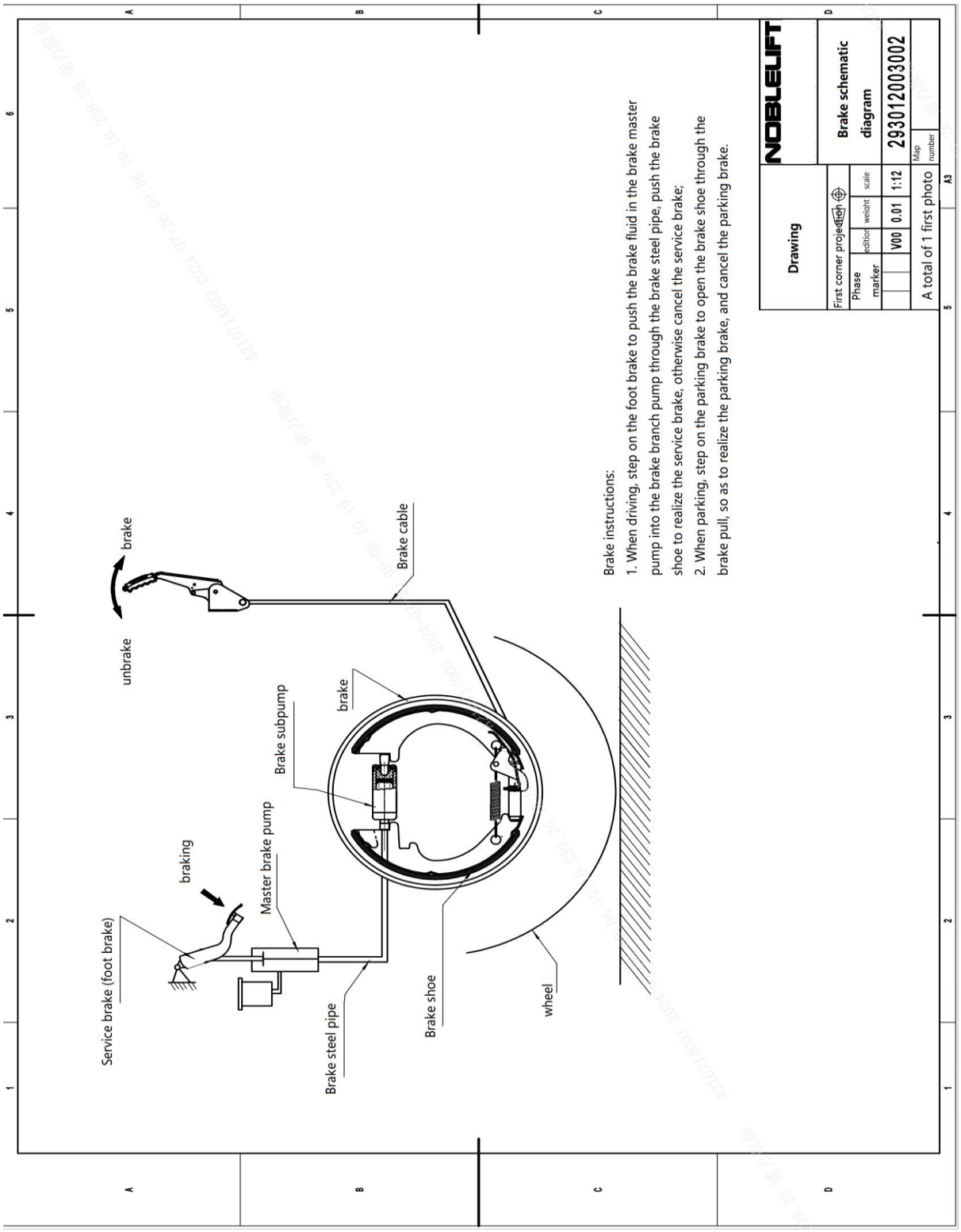
Icon 1-4 Frame of door

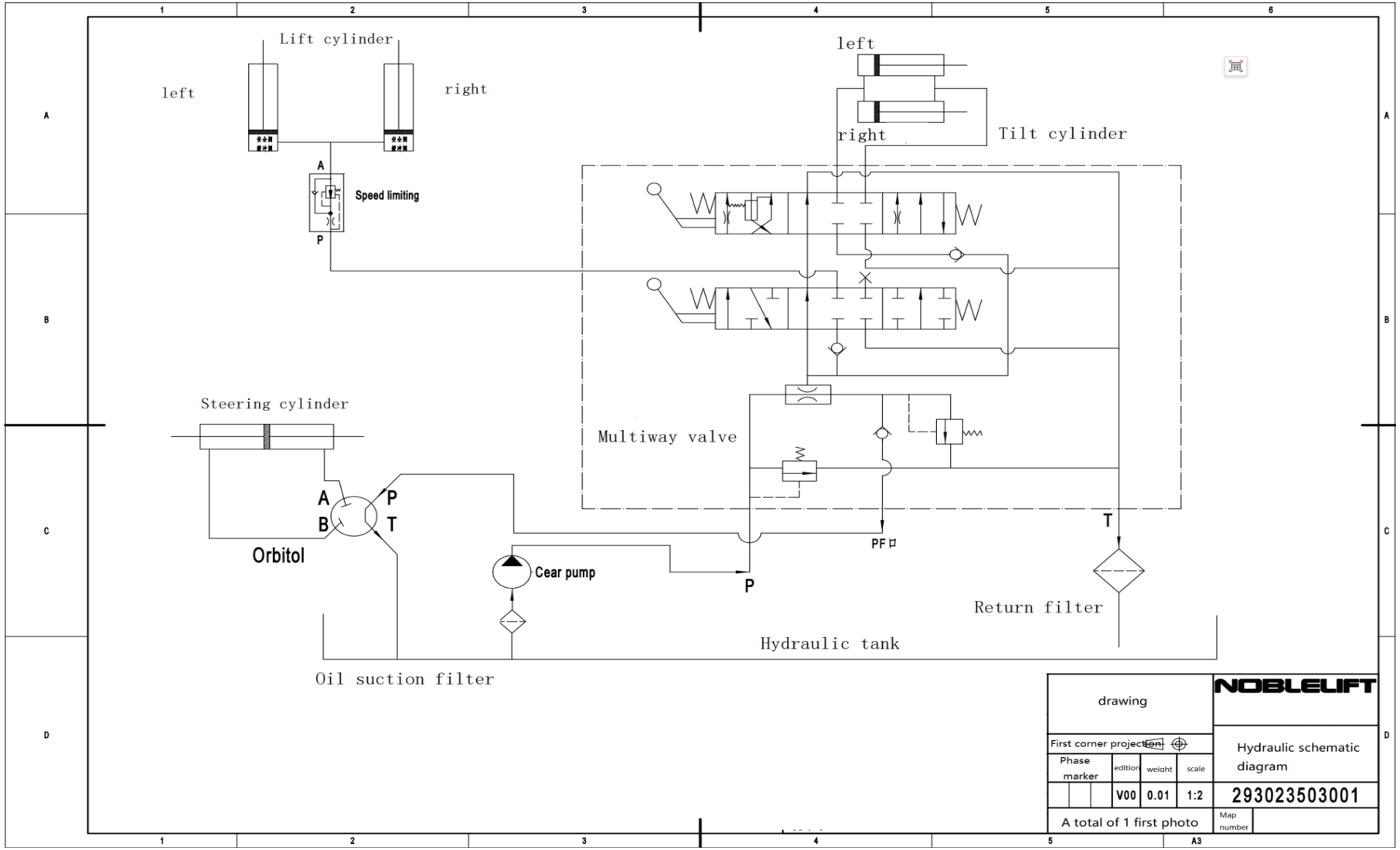


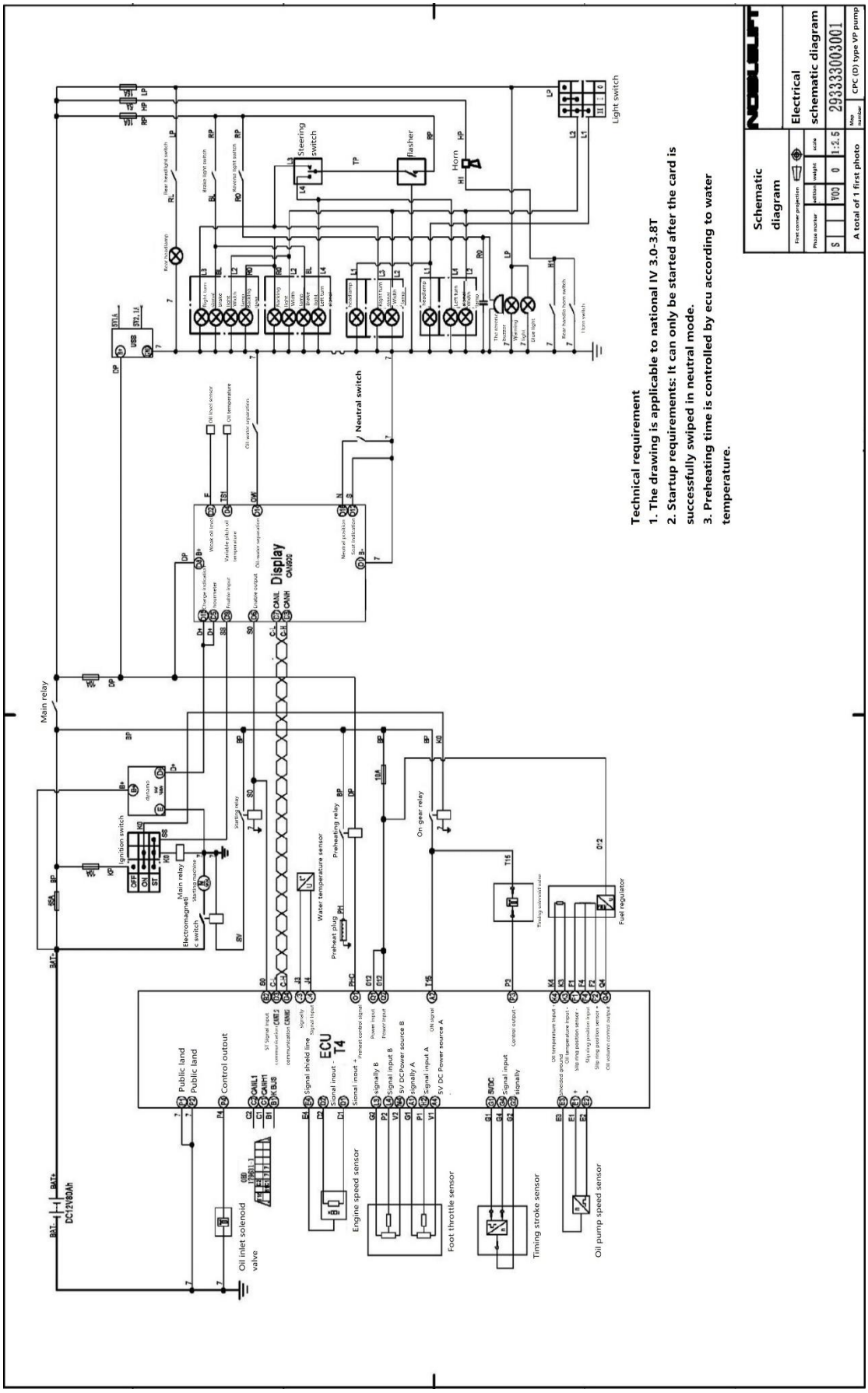
Icon 1-5 Fork rack

Truck frame, door frame, fork and fork frame are the main force structural parts of forklift truck, which have sufficient strength and stiffness. If the user chooses a fixture, the fixture is equivalent to a cargo fork and is the main force structural part.

VI、Schematic diagram




Lift cylinder
left
right
A
Speed limiting
P
left
right
Tilt cylinder
Steering cylinder
Multiway valve
A
B
P
T
Orbitol
Cear pump
PF口
P
T
Return filter
Hydraulic tank
Oil suction filter
drawing
NOBLELIFT
First corner projection
Hydraulic schematic diagram
Phase marker
edition
weight
scale
V00
0.01
1:2
293023503001
A total of 1 first photo
Map number
A3


Schematic diagram
Electrical schematic diagram
Front view projection
Sheet number
Weight
Scale
1:2.5
293333003001
A total of 1 first photo
CPC (D) type VP pump
Technical requirement
1. The drawing is applicable to national IV 3.0-3.8T
2. Startup requirements: It can only be started after the card is successfully swiped in neutral mode.
3. Preheating time is controlled by ecu according to water temperature.
Display
ECU
T4
Main relay
Ignition switch
Electromagnetic switch
Starting relay
Preheat relay
On gear relay
Neutral switch
Steering switch
Horn
Light switch
Water temperature sensor
Preheat plug
Fuel regulator
Timing solenoid valve
Engine speed sensor
Foot throttle sensor
Timing stroke sensor
Oil pump speed sensor
Oil inlet solenoid valve
Public land
Control output
Signal shield line
Signal input
Signal A
Signal B
5V DC Power source A
5V DC Power source B
ON signal
Control output
Shielded ground
Oil temperature input
Slip ring position sensor
Oil volume control output
DC12V80Ah

Model	Generator	Main drive	Rated lifting weight（t）/ Load center (mm)（mm）
CPC20-AX1(machinery)	Xinchai 4D29V41-050（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AX2(machinery)	Xinchai 4D32V41-018（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AX4(machinery)	Xinchai C490BPG-450（National II）	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AX5(machinery)	Xinchai 3E22YG51(Euro V)	JDS30Ⅱ Mechanical gearbox	2.0/500
CPC20-AX6(machinery)	Xinchai 4D29X41（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AQ1(machinery)	Quanchai V29-50V42（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AS1(machinery)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	JDS30Ⅱ-3 Mechanical gearbox	2.0/500
CPC20-AW1(machinery)	Isuzu C240 (Euro IIIA)	JDS30Ⅱ Mechanical gearbox	2.0/500
CPC25-AX1(machinery)	Xinchai 4D29V41-050（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AX2(machinery)	Xinchai 4D32V41-018（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AX4(machinery)	Xinchai C490BPG-450（National II）	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AX5(machinery)	Xinchai 3E22YG51(Euro V)	JDS30Ⅱ Mechanical gearbox	2.5/500
CPC25-AX6(machinery)	Xinchai 4D29X41（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AQ1(machinery)	Quanchai V29-50V42（National IV）	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AS1(machinery)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	JDS30Ⅱ-3 Mechanical gearbox	2.5/500
CPC25-AW1(machinery)	Isuzu C240 (Euro IIIA)	JDS30Ⅱ Mechanical gearbox	2.5/500
CPC30-N1X1(machinery)	Xinchai 4D29V41-050（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.0/500
CPC30-N1X2(machinery)	Xinchai 4D32V41-018（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.0/500
CPC30-N1X4(machinery)	Xinchai C490BPG-450（National II）	JDS30Ⅱ-3 Mechanical gearbox	3.0/500

CPC30-N1X5(machinery)	Xinchai 3E22YG51(Euro V)	JDS30Ⅱ Mechanical gearbox	3.0/500
CPC30-N1X6(machinery)	Xinchai 4D29X41(National Ⅳ common rail)	JDS30Ⅱ-3 Mechanical gearbox	3.0/500
CPC30-N1Q1(machinery)	Quanchai V29-50V42（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.0/500
CPC30-N1S1(machinery)	Mitsubishi S4S-Z364CSF	JDS30Ⅱ Mechanical gearbox	3.0/500
CPC30-N1W1(machinery)	Isuzu C240	JDS30Ⅱ Mechanical gearbox	3.0/500
CPC35-N1X1(machinery)	Xinchai 4D29V41-050（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.5/500
CPC35-N1X2(machinery)	Xinchai 4D32V41-018（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.5/500
CPC35-N1X4(machinery)	Xinchai C490BPG-450（National II）	JDS30Ⅱ-3 Mechanical gearbox	3.5/500
CPC35-N1X5(machinery)	Xinchai 3E22YG51(Euro V)	JDS30Ⅱ Mechanical gearbox	3.5/500
CPC35-N1X6(machinery)	Xinchai 4D29X41(National Ⅳ common rail)	JDS30Ⅱ-3 Mechanical gearbox	3.5/500
CPC35-N1Q1(machinery)	Quanchai V29-50V42（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.5/500
CPC35-N1S1(machinery)	Mitsubishi S4S-Z364CSF	JDS30Ⅱ Mechanical gearbox	3.5/500
CPC35-N1W1(machinery)	Isuzu C240	JDS30Ⅱ Mechanical gearbox	3.5/500
CPC38-N1X1(machinery)	Xinchai 4D29V41-050（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.8/500
CPC38-N1X2(machinery)	Xinchai 4D32V41-018（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.8/500
CPC38-N1X4(machinery)	Xinchai C490BPG-450（National II）	JDS30Ⅱ-3 Mechanical gearbox	3.8/500
CPC38-N1X5(machinery)	Xinchai 3E22YG51(Euro V)	JDS30Ⅱ Mechanical gearbox	3.8/500
CPC38-N1X6(machinery)	Xinchai 4D29X41(National Ⅳ common rail)	JDS30Ⅱ-3 Mechanical gearbox	3.8/500
CPC38-N1Q1(machinery)	Quanchai V29-50V42（National IV）	JDS30Ⅱ-3 Mechanical gearbox	3.8/500
CPC38-N1S1(machinery)	Mitsubishi S4S-Z364CSF	JDS30Ⅱ Mechanical gearbox	3.8/500
CPC38-N1W1(machinery)	Isuzu C240	JDS30Ⅱ Mechanical gearbox	3.8/500
CPCD20-AX1(hydraulic)	Xinchai 4D29V41-050（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.0/500

CPCD20-AX2(hydraulic)	Xinchai 4D32V41-018（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.0/500
CPCD20-AX4(hydraulic)	Xinchai C490BPG-450（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.0/500
CPCD20-AX5(hydraulic)	Xinchai 3E22YG51(Euro V)	YQX30/YQXD30 Hydraulic transmission	2.0/500
CPCD20-AX6(hydraulic)	Xinchai 4D29X41（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.0/500
CPCD20-AQ1(hydraulic)	Quanchai V29-50V42（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.0/500
CPCD20-AS1(hydraulic)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	YQX30/YQXD30 Hydraulic transmission	2.0/500
CPCD20-AW1(hydraulic)	Isuzu C240 (Euro IIIA)	YQX30/YQXD30 Hydraulic transmission	2.0/500
CPCD25-AX1(hydraulic)	Xinchai 4D29V41-050（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.5/500
CPCD25-AX2(hydraulic)	Xinchai 4D32V41-018（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.5/500
CPCD25-AX4(hydraulic)	Xinchai C490BPG-450（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.5/500
CPCD25-AX5(hydraulic)	Xinchai 3E22YG51(Euro V)	YQX30/YQXD30 Hydraulic transmission	2.5/500
CPCD25-AX6(hydraulic)	Xinchai 4D29X41（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.5/500
CPCD25-AQ1(hydraulic)	Quanchai V29-50V42（National IV electrohydraulic）	YQX30A/YQXD30A Hydraulic transmission	2.5/500
CPCD25-AS1(hydraulic)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	YQX30/YQXD30 Hydraulic transmission	2.5/500
CPCD25-AW1(hydraulic)	Isuzu C240 (Euro IIIA)	YQX30/YQXD30 Hydraulic transmission	2.5/500
CPCD30-N1X1(hydraulic)	Xinchai 4D29V41-050（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.0/500
CPCD30-N1X2(hydraulic)	Xinchai 4D32V41-018（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.0/500

CPCD30-N1X4(hydraulic)	Xinchai C490BPG-450(National IV Electric Fluid)	YQX30A/YQXD30A Hydraulic transmission	3.0/500
CPCD30-N1X5(hydraulic)	Xinchai 3E22YG51 (Euro V)	YQXD30 Hydraulic transmission	3.0/500
CPCD30-N1X6(hydraulic)	Xinchai 4D29X41(National IV common rail containing electric fluid)	YQX30A/YQXD30A Hydraulic transmission	3.0/500
CPCD30-N1Q1(hydraulic)	Quanchai V29-50V42（National IV Electric Fluid）	YQX30 Hydraulic transmission	3.0/500
CPCD30-N1S1(hydraulic)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	YQXD30 Hydraulic transmission	3.0/500
CPCD30-N1W1(hydraulic)	Isuzu C240 (Euro IIIA)	YQXD30 Hydraulic transmission	3.0/500
CPCD35-N1X1(hydraulic)	Xinchai 4D29V41-050（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.5/500
CPCD35-N1X2(hydraulic)	Xinchai 4D32V41-018（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.5/500
CPCD35-N1X4(hydraulic)	Xinchai C490BPG-450(National IV Electric Fluid)	YQX30A/YQXD30A Hydraulic transmission	3.5/500
CPCD35-N1X5(hydraulic)	Xinchai 3E22YG51 (Euro V)	YQXD30 Hydraulic transmission	3.5/500
CPCD35-N1X6(hydraulic)	Xinchai 4D29X41(National IV common rail containing electric fluid)	YQX30A/YQXD30A Hydraulic transmission	3.5/500
CPCD35-N1Q1(hydraulic)	Quanchai V29-50V42（National IV Electric Fluid）	YQX30 Hydraulic transmission	3.5/500
CPCD35-N1S1(hydraulic)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	YQXD30 Hydraulic transmission	3.5/500
CPCD35-N1W1(hydraulic)	Isuzu C240 (Euro IIIA)	YQXD30 Hydraulic transmission	3.5/500
CPCD38-N1X1(hydraulic)	Xinchai 4D29V41-050（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.8/500
CPCD38-N1X2(hydraulic)	Xinchai 4D32V41-018（National IV）	YQX30A/YQXD30A Hydraulic transmission	3.8/500
CPCD38-N1X4(hydraulic)	Xinchai C490BPG-450(National IV Electric	YQX30A/YQXD30A Hydraulic transmission	3.8/500
CPCD38-N1X5(hydraulic)	Xinchai 3E22YG51 (Euro V)	YQXD30 Hydraulic transmission	3.8/500

CPCD38-N1X6(hydraulic)	Xinchai 4D29X41(National IV common rail containing	YQX30A/YQXD30A Hydraulic transmission	3.8/500
CPCD38-N1Q1(hydraulic)	Quanchai V29-50V42（National IV Electric	YQX30 Hydraulic transmission	3.8/500
CPCD38-N1S1(hydraulic)	Mitsubishi S4S-Z364CSFL (Euro IIIA)	YQXD30 Hydraulic transmission	3.8/500
CPCD38-N1W1(hydraulic)	Isuzu C240 (Euro IIIA)	YQXD30 Hydraulic transmission	3.8/500

Specificity	1.1	Manufacturers（For short）		Noblelift	Noblelift
	1.2	Noblelift Model		CPC(D)20-AX1	CPC(D)25-AX1
	1.3	Dynamic mode：electric，Diesel，Gasoline，		Diesel	Diesel
	1.4	Mode of operation： Station driver，Mount，		Seated	Seated
	1.5	Rated load capacity	Q(kg)	2000	2500
	1.6	Load center distance	C(mm)	500	500
	1.8	Front overhang	x(mm)	465	465
	1.9	wheelbase	y(mm)	1660	1660
Weight	2.1	Self weight	kg	3500	3800
	2.2	Bridge load at full load, front / Rear	kg	4870/630	5600/730
	2.3	Bridge load at unload, front / Rear	kg	1600/1900	1600/2200
Wheel	3.1	tyre: Solid tire, Pneumatic tyres		Pneumatic tyres	Pneumatic tyres
	3.2	Front wheel specification		7.00-12-12PR	7.00-12-12PR
	3.3	Rear wheel specification		6.00-9-10PR	6.00-9-10PR
	3.5	Number of wheels, front / Rear （×= Driving wheel		2X/2	2X/2
	3.6	Front wheel gauge	b10(mm)	973	973
	3.7	The rear wheel base	b11(mm)	980	980
Parameter of size	4.1	gantry / Dip Angle, forerake / hypsokinesis	α/β(°)	6/12	6/12
	4.2	Gantry retracting height	h1(mm)	1995	1995
	4.3	Free lifting height	h2(mm)	140	140
	4.4	Lifting height	h3(mm)	3000	3000
	4.4a	Lifting height (Fork thickness)	h23(mm)	3040	3040
	4.5	Gantry development height	h4(mm)	4025	4025
	4.7	Height of the roof frame	h6(mm)	2130	2130
	4.8	Seat height	h7(mm)	1030	1030
	4.12	Traction pin height	h10(mm)	400	400
	4.19	Overall length	l1(mm)	3698	3698
	4.20	Body length (No fork included)	l2(mm)	2628	2628
	4.21	Overall width (frame / tyre)	b1(mm)	1150/1163	1150/1163
	4.22	Fork size	s/e/l(mm)	1070/120/40	1070/120/40
	4.23	Fork mounting grade		3A	3A

	4.24	Width of fork rack	b3(mm)	1040	1040
	4.31	Ground clearance under gantry （unloaded）	m1(mm)	120	120
	4.32	Wheelbase center ground clearance （unloaded）	m2(mm)	170	170
	4.34.1	Working channel width,1000X1200 tray (1200 Place along the fork)	Ast(mm)	3935	3935
	4.34.2	Working channel width,800X1200 tray (1200 Place along the fork)	Ast(mm)	4135	4135
	4.35	Turning radius	Wa(mm)	2270	2270
	4.36	Inside turning radius	b13(mm)	615	615

peculiarity	1.1	Manufacturers (For short)		Noblelift	Noblelift
	1.2	Noblelift Model		CPC(D)20-AX1	CPC(D)25-AX1
Performance parameter	5.1	Travel speed, Full load /unload	km/h	18/18	18/18
	5.2	Lifting speed, Full load /unload	mm/s	580/600	580/600
	5.3	Rate of descent, Full load /unload	mm/s	400/420	400/420
	5.6	Maximum tractive effort, Full load /unload Mechanical drive	kN	20/13	20/13
	5.6a	Maximum tractive effort, Full load /unload Hydraulic transmission	kN	20/13	20/13
	5.7	gradability, Full load /unload S2 Mechanical drive	%	20/20	20/20
	5.7a	gradability, Full load /unload S2 Hydraulic transmission	%	20/20	20/20
	5.10	Service brake		Hydraulic	Hydraulic
engine	7.1	Engine type		Xinchai 4D29V41 (National IV)	Xinchai 4D29V41 (National IV)
	7.2	Engine rating ISO1585	kw	36.8	36.8
	7.3	Rated speed	rpm	2500	2500
	7.4	Number of cylinders / displacement	cm3	4/2850	4/2850
	7.5a	Maximum torque	N.m/rpm	165/1600-1800	165/1600-1800
	7.9	Rated voltage of vehicle system	V	12	12
	7.10	Starting battery capacity	V/Ah	12/80	12/80
gearbox	8.1	Transmission type		Mechanical (hydraulic)	Mechanical (hydraulic)
	8.2	Gear position		2/2 (1/1)	2/2 (1/1)

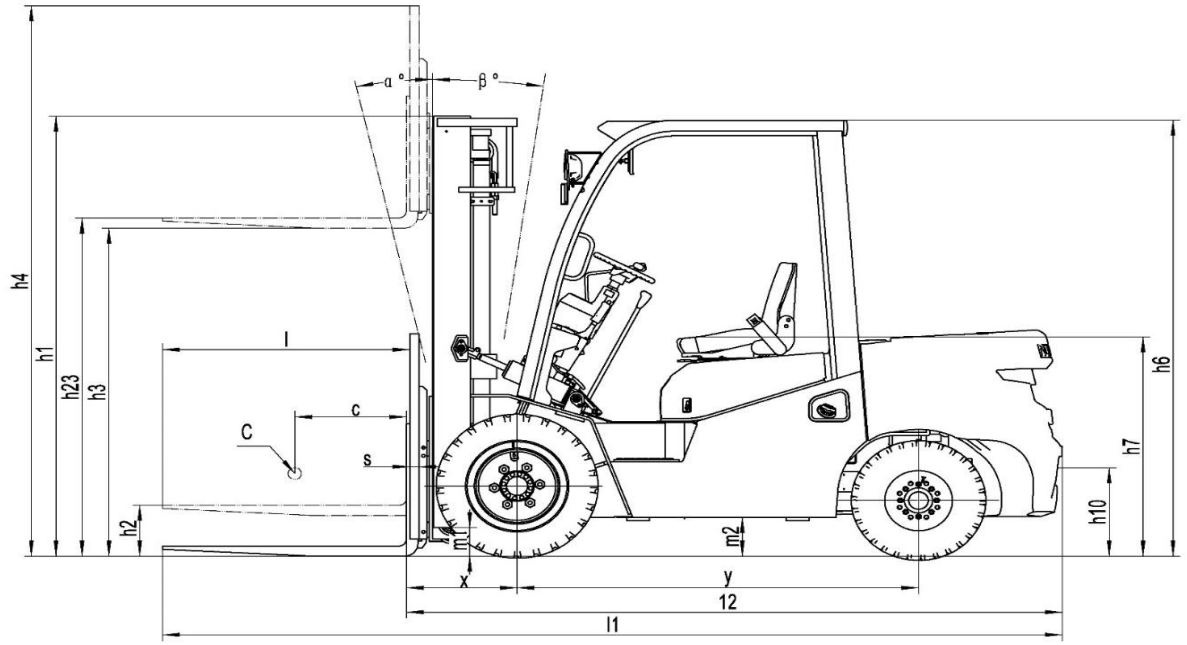
		advance / back			
	8.3	Shifting mode		Mechanical(Hydraulic)	Mechanical(Hydraulic)
Others	10.1	fitting Working pressure	Mpa	18.5	18.5
	10.2	fitting Working flow	L/min	60	60
	10.4	Tank capacity	L	60	60
	10.8	Traction pin specification DIN 15170		30	30

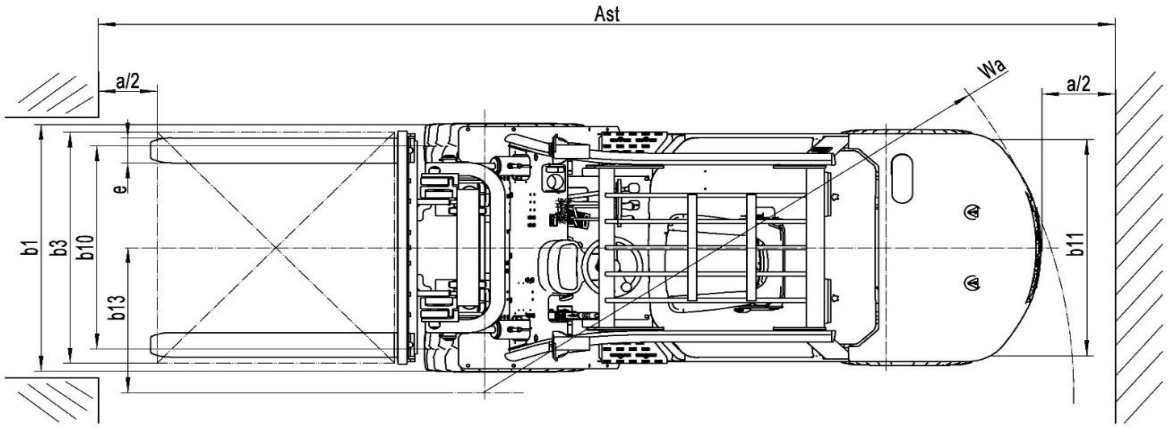
Specificity	1.1	Manufacturers（For short）		Noblelift	Noblelift	Noblelift
	1.2	Noblelift Model		CPC(D)30-N1X1	CPC(D)35-N1X1	CPC(D)38-N1X1
	1.3	Dynamic mode：electric，Diesel，Gasoline，		Diesel	Diesel	Diesel
	1.4	Mode of operation： Station driver，Mount，		Seated	Seated	Seated
	1.5	Rated load capacity	Q(kg)	3000	3500	3800
	1.6	Load center distance	C(mm)	500	500	500
	1.8	Front overhang	x(mm)	480	485	485
	1.9	wheelbase	y(mm)	1760	1760	1760
Weight	2.1	Self weight	kg	4250	4560	4760
	2.2	Bridge load at full load, front / Rear	kg	6450/800	7220/840	7690/870
	2.3	Bridge load at unload, front / Rear	kg	1750/2500	1760/2800	1760/3000
Wheel	3.1	tyre: Solid tire, Pneumatic tyres		Pneumatic tyres	Pneumatic tyres	Pneumatic tyres
	3.2	Front wheel specification		28x9-15-14PR	28x9-15-14PR	28x9-15-14PR
	3.3	Rear wheel specification		6.50-10-10PR	6.50-10-10PR	6.50-10-10PR
	3.5	Number of wheels, front / Rear （×= Driving wheel		2X/2	2X/2	2X/2
	3.6	Front wheel gauge	b10(mm)	1000	1000	1000
	3.7	The rear wheel base	b11(mm)	980	980	980
Parameter of size	4.1	gantry / Dip Angle, forerake / hypsokinesis	α/β(°)	6/12	6/12	6/12
	4.2	Gantry retracting height	h1(mm)	2055	2170	2170
	4.3	Free lifting height	h2(mm)	145	150	150
	4.4	Lifting height	h3(mm)	3000	3000	3000
	4.4a	Lifting height (Fork thickness)	h23(mm)	3045	3050	3050
	4.5	Gantry development height	h4(mm)	4105	4105	4105
	4.7	Height of the roof frame	h6(mm)	2150	2150	2150
	4.8	Seat height	h7(mm)	1050	1050	1050
	4.12	Traction pin height	h10(mm)	420	420	420
	4.19	Overall length	l1(mm)	3840	3905	3945
	4.20	Body length (No fork included)	l2(mm)	2770	2835	2875
	4.21	Overall width (frame / tyre)	b1(mm)	1195/1228	1195/1228	1195/1228
	4.22	Fork size	s/e/l(mm)	1070/122/45	1070/122/50	1070/122/50

	4.23	Fork mounting grade		3A	3A	3A
	4.24	Width of fork rack	b3(mm)	1100	1100	1100
	4.31	Ground clearance under gantry （unloaded）	m1(mm)	140	140	140
	4.32	Wheelbase center ground clearance （unloaded）	m2(mm)	190	190	190
	4.34.1	Working channel width,1000X1200 tray (1200 Place along the fork)	Ast(mm)	4130	4195	4225
	4.34.2	Working channel width,800X1200 tray (1200 Place along the fork)	Ast(mm)	4330	4395	4425
	4.35	Turning radius	Wa(mm)	2450	2510	2540
	4.36	Inside turning radius	b13(mm)	715	715	715

peculiarity	1.1	Manufacturers（For short）		Noblelift	Noblelift	Noblelift
	1.2	Noblelift Model		CPC(D)30-N1X1	CPC(D)35-N1X1	CPC(D)38-N1X1
Performance parameter	5.1	Travel speed, Full load /unload	km/h	19/20	19/20	19/20
	5.2	Lifting speed, Full load /unload	mm/s	460/480	380/410	380/410
	5.3	Rate of descent, Full load /unload	mm/s	410/430	410/430	410/430
	5.6	Maximum tractive effort, Full load /unload Mechanical drive	kN	21/17	21/17	21/16
	5.6a	Maximum tractive effort, Full load /unload Hydraulic transmission	kN	21/17	21/17	21/16
	5.7	gradability, Full load /unload S2 Mechanical drive	%	20/20	20/20	20/20
	5.7a	gradability, Full load /unload S2 Hydraulic transmission	%	20/20	20/20	20/20
	5.10	Service brake		Hydraulic	Hydraulic	Hydraulic
engine	7.1	Engine type		Xinchai 4D29V41（National IV）	Xinchai 4D29V41（National IV）	Xinchai 4D29V41（National IV）
	7.2	Engine rating ISO1585	kw	36.8	36.8	36.8
	7.3	Rated speed	rpm	2500	2500	2500
	7.4	Number of cylinders / displacement	cm3	4/2850	4/2850	4/2850
	7.5a	Maximum torque	N.m/rpm	165/1600-1800	165/1600-1800	165/1600-1800
	7.9	Rated voltage of vehicle system	V	12	12	12
	7.10	Starting battery capacity	V/Ah	12/80	12/80	12/80
gearbox	8.1	Transmission type		Mechanical（hydraulic）	Mechanical（hydraulic）	Mechanical（hydraulic）
	8.2	Gear position		2/2（1/1）	2/2（1/1）	2/2（1/1）

		advance / back				
	8.3	Shifting mode		Mechanical(Hydraulic)	Mechanical(Hydraulic)	Mechanical(Hydraulic)
Others	10.1	fitting Working pressure	Mpa	18.5	18.5	18.5
	10.2	fitting Working flow	L/min	70	70	70
	10.4	Tank capacity	L	70	70	70
	10.8	Traction pin specification DIN 15170		30	30	30





Ⅰ、Controls

1、Safety code

1、Only trained and approved operators are allowed to operate forklifts

2、Regular inspection of oil, water leakage, deformation, loosening and other conditions, neglect of inspection will shorten the life of the vehicle, in bad circumstances will lead to accidents.

Ensure that "critical safety parts" are replaced during regular inspections.

Wipe oil, grease, or water off the baseplate, pedals, and joysticks.

When inspecting the engine and its associated components, turn off the engine, paying particular attention to the fan.

When checking the water tank or muffler, be careful not to get burned.

3、Whenever a vehicle is found to be not working properly, it should be stopped and reported to management:

If high maintenance (such as door frame, front, rear lights, etc.) should pay attention to safety, to prevent clamping or sliding

If the alarm light is on or other faults occur, the vehicle should be driven to a safe place for inspection and troubleshooting.

During maintenance and repair, pay attention to the edges and sharp edges of the parts that may be touched by the hand, head and body to prevent scratches and scratches. A "fault" sign is displayed on the faulty vehicle.

4、Do not use open flame to check fuel level, electrolyte or cooling water and leak.

Do not smoke when checking battery, filling fuel or checking fuel system to prevent explosion.

The workplace should be equipped with fire extinguishers.

Do not fill the fuel tank while the engine is running.

5、Before operation, preheat the forklift to 70℃ water temperature;

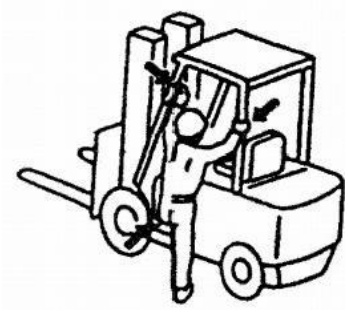
Do not open the water tank cover when the water temperature is higher than 70 ° C.

6、The exhaust gas (carbon monoxide CO) emitted is harmful to the human body, and when the forklift is working in a closed space, it should be ensured that there are enough vents and ventilation fans if necessary.

Look out

Do not use in flammable and explosive environment。

7、Do not get on or off the forklift when it is running. Use the safety pedals and handrails of the forklift when getting on or off the forklift.



8、Sit firmly before operating the forklift

Before starting, adjust the seat position to facilitate hand and foot control.

9、Confirm before starting:

① No one is around the forklift

② Middle position of front and rear reversing lever。

10、Stop on the level, pull the overhand brake, if you must stop on the ramp, be sure to use the wedge pad on the wheel.

Drop the fork to the ground and lean forward slightly, turn off the engine and remove the key.

11、The operation should be smooth and accurate. Avoid stopping, turning, or swerving sharply.

12、Control speed and obey traffic signals.

Look out

Obey traffic rules when driving on highways or streets.

13、Pay attention to the direction of travel and maintain a good view.

14、No one else is allowed to sit on a fork, pallet or forklift.

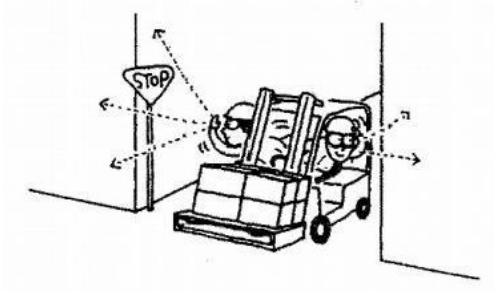
15、When passing the ship plate or bridge plate, make sure that it is properly fixed and has enough strength to bear the weight of the forklift truck, and check the ground condition of the work site in advance.

16、Concentrate on your work.

17、Keep your head, arms, legs and feet in the cab and don't stick out for any reason.

18、When handling oversized cargo that obstructs the view, please reverse the road or be guided by a guide.

19、Slow down through cross passages or other sections with poor visibility, and honk the horn, and the driving speed is limited to 1/3 of the maximum operating speed of the vehicle.



20. The forklift is run as far away from liquefaction tanks, wood, paper and chemicals as possible, and the exhaust gas from the muffler may cause combustion or explosion.

21. The night operation uses headlights and wide lights to control the driving speed.

22. The working road surface of forklift truck is solid and flat cement road surface, asphalt road or concrete road surface.

The vehicle shall operate in accordance with the following normal climatic conditions:

——Average ambient temperature under continuous operating conditions:+25℃

——Maximum ambient temperature in a short period (≤1h):+40℃;

——Minimum ambient temperature when using the vehicle under normal indoor conditions:+5℃

——Minimum ambient temperature when using the vehicle under normal outdoor conditions:-20℃;

——altitude:≤2000m。

Look out

Check the road you will be driving on. Check for holes, steep obstacles, bumps, and other road conditions that may cause loss of control and turbulence.

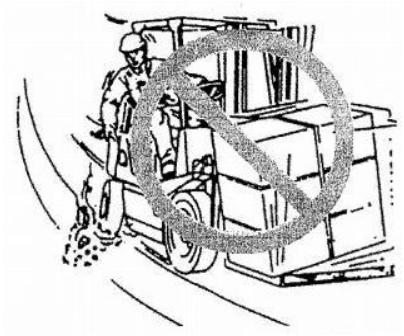
- Remove garbage, debris and foreign objects that may puncture tires and throw cargo off balance.

- Drive slowly on slippery roads, don't drive on the edge of the road, and take extra care when you can't avoid it.

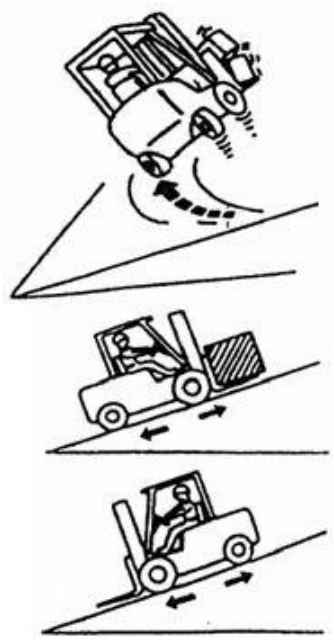
- The ground is uneven, which will cause vehicle vibration and produce noise. Excessive tire pressure will also cause vehicle vibration and noise.

Look out

Do not use forklift trucks in harsh weather conditions such as wind, sand, snow, thunder, rain, and strong winds.



23、Reverse downhill under load, foreground climb. In contrast to the load, do not turn on the ramp to avoid tipping.



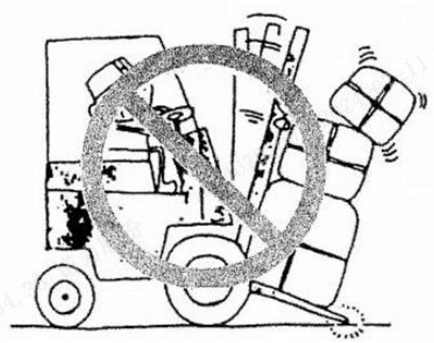
24、When driving downhill, please use the engine idle speed, and should intermittently press the brake pedal.

25、Regardless of no-load or load, it is dangerous to drive with the fork raised, and maintain the standard operating state (15cm ~ 30cm off the ground).

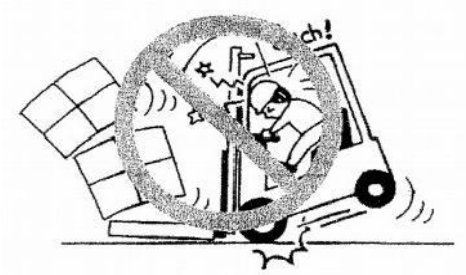
Do not move the fork of a forklift with a side shifter when the load rises to avoid the forklift losing balance.

Forklifts with fittings shall be considered as vehicle loads.

26、When the load is running, the gantry leans back and reduces the height of the cargo as much as possible.



27、Avoid sudden braking or rapid downhill, so as not to fall or overturn the goods, emergency braking danger.



28、The forklift truck can be reversed when it stops completely; Vice versa.

29、Select the appropriate accessories and tools according to the shape and material of the cargo.

Do not use a rope to lift the cargo from the fork or equipment. The rope may slip. If necessary, let a person qualified to lift the cargo use a hook or lifting arm.

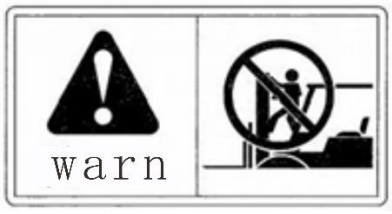
> **Look out**
>
> **Do not let the fork touch the ground, so as not to cause damage to the fork tips and road surface.**

30、Understand the load curve of forklift trucks and accessories, do not overload. It is forbidden to use people as additional counterweights, which is very dangerous.

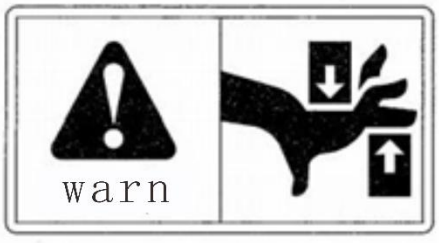
31、Roof guard against being hit by high loads. Stop the shelf to ensure stable loading. Forklift trucks without top guard and rack are not allowed.

32. It is forbidden to stand or walk under forks or utensils. No one is allowed to stand on the fork.

33、Do not stretch your head or body between the door frame and the top guard frame. It could be life-threatening if it gets caught.



Do not reach between the inner and outer frames

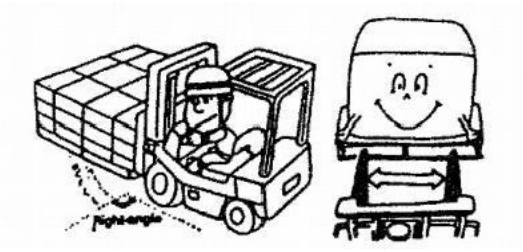


34、When the noise near the driver's ear is greater than 80dB, the driver should take hearing protection measures.

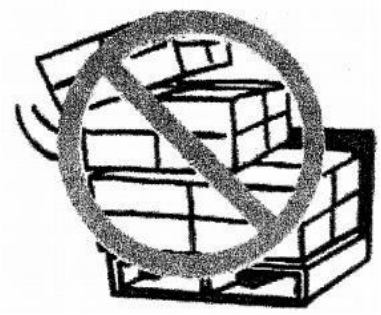
Look out

Rough or uneven working road surface, large tire deformation, will make the noise value greater.

35、When picking up from the stack, enter the area head-on and insert the fork carefully into the pallet.



36、The goods are not allowed to deviate from the center of the fork, and it is easy to fall when the goods deviate from the center of the fork, turn or pass the uneven road surface. At the same time, the likelihood of rollover increases.



37、It is forbidden to load the goods at high speed, and the goods should be fixed and reliable before the fork is lifted.

Pause briefly before lifting the goods, make sure there are no obstacles, and then lift again.

38、Ensure that the bundles of goods are firmly placed on the two forks. Do not use a single fork to lift the goods.

Forklift with fittings (such as flat clamps), make sure the package is secure and clamped, and then pull the multiway valve lever into place.

39、Do not lift the cargo when the forklift tilts the ground, and avoid loading and unloading operations on ramps.

40、The height of the goods should not exceed the shelf, and when inevitable, the goods should be fixed. Handling large volumes of cargo obstructs the sight, should be driven in reverse or guided by a guide.

41、When unloading, the forward Angle should be reduced as far as possible, and the goods can be tilted forward only when they are slightly higher than the stacking layer or at a low level.

When stacking at a high height, let the door frame be vertical when it is 15cm ~ 20cm from the ground, and then lift it, pay attention to the goods when they are raised, do not let the door frame tilt.

When the goods are high, the fork is inserted into the pallet, and then slowly raised, backed up and then lowered, and the rear door frame is lowered backward. The goods should never tilt the door frame when they are high.

42、Do not tow vehicles with faulty engines, abnormal steering and damaged braking systems. Obey traffic rules when towing a vehicle on the highway.

43、Work according to the environment should wear work clothes and other personal safety protective devices, such as: ear muffs, safety hats, protective goggles, dust masks, safety boots, anti-static clothing, for safety do not wear ties or accessories.

44、The workplace should be equipped with fire extinguishers. The user can also choose to configure a fire extinguisher with the vehicle, which is generally installed on the rear leg of the safety frame for easy access.

Drivers and managers should be familiar with the location and use of fire extinguishers.

45、Pallet should be used to handle small items, not directly placed on the fork.

46、The signs on the car have warnings and instructions. Please follow the instructions in this manual and the car label when operating.

Inspect signs, signs, and markings, and replace damaged or missing signs, signs, and markings.

47、The accessories provided by NOLI forklift truck for users, such as rotating clips, flat clips, side shifting forks, lifting arms, etc., can only be dedicated. If you need to

modify the fittings, you must obtain the permission of the manufacturer. Do yourself a favor.

48、In view of the driver's irregular use of mobile phones, endangering the safety of life and property, the use of mobile phones by drivers is prohibited in the safety rules: the use of mobile phones or other electronic communication equipment unrelated to the vehicle is based on the operation.

Look out

Tail gas

Exhaust gas from internal combustion engines contains carbon monoxide and other harmful chemicals. Carbon monoxide is a colorless, odorless poison and can cause loss of consciousness or death without warning. Long-term exposure to exhaust fumes or exhaust chemicals can cause cancer, birth defects and other fertility hazards. Exposure to engine exhaust should be avoided.

If the engine is running in an enclosed space, maintain proper ventilation or exhaust to the outside. Do not exceed acceptable air pollutant limits.

Follow the inspection and maintenance schedules and procedures in this manual as well as in the engine manual. Do not change exhaust, ignition or fuel systems.

Look out

Fire hazard

When the operation area of the internal combustion forklift contains flammable gases, steam, liquids, dust, or fibers, the hot engine surface and exhaust gas may cause a fire. The surface temperature of engine and exhaust components may exceed the ignition temperature of commonly used solvents, fuel oil, motor oil, paper and other organic materials (wood, agricultural weeds/grain, cotton, wool, etc.). Sparks from exhaust gas can also ignite the material. Engine and exhaust pipe surface temperatures increase after the engine is turned off, increasing the risk of fire. When the vehicle is working in an area containing flammable dust, fibers or paper, the engine compartment should be inspected immediately and any debris should be removed.

warn

If the forklift is damaged or malfunctioning, do not start the forklift until it is repaired and restored.

2、start

Diesel forklift starting

① Shift handle in neutral position.

② Turn the start switch to the "" position to start, after starting, the key to the" "position.

Look out

When the environment is below 5 ° C, the key should be placed right " | "preheat, When the preheating light is off, the key can be turned to " ⇀ " Position start.

Gasoline engine forklift starting

① Shift handle in neutral position

② refrigerator

Fully open the choke button, press the accelerator pedal for 2 to 3 times, then release, turn the key switch to the "START" position, and release the key.

③ Heat engine

If the choke button does not open, press down half of the accelerator pedal and hold it, turn the key switch to the "START" position to start, and release the key after starting.

Look out

When the heat engine starts, please do not step on the accelerator pedal to the end, this operation will make it difficult to start, and the pedal will make it difficult to start several times.

Look out

A start time can not exceed 5 seconds, each start interval shall not be less than 2 minutes.

After the engine starts

① Preheat the engine for about 5 minutes.

② Check engine operation.

Look out

Diesel engine:

After the diesel engine starts, increase the throttle to make it run at a moderate speed (1800r/min~2000r/min), and warm up the empty car.

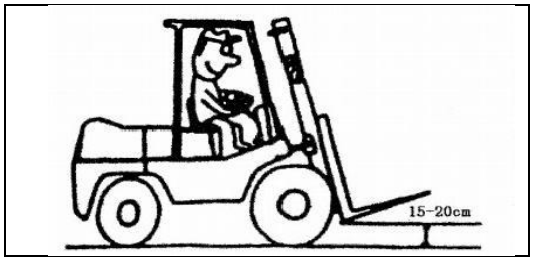
After the gasoline engine starts, push the choke bit by bit, observe the preheating condition and the stability of the gasoline engine speed, and confirm that the choke is fully preheated.

- Check for compressed (or non-angry) sound.
- Check the exhaust status.
- Ensure that all indicators are off.
- After the engine is fully preheated, operate the multi-way valve lever 2~3 times in the whole process to check the working condition of the door frame.

3、operation

① Hold the wheel with your left hand. Place your right hand gently on the steering wheel and prepare for loading and unloading.

② The bottom of the fork is 15~20cm off the ground, and the door frame is tilted back into place.



③ Look around the forklift, check for pedestrians, honk.

Mechanically driven forklift truck

- Press the clutch pedal and operate the shift handle.
- Release hand brake.
- Press down on the gas pedal while slowly releasing the clutch pedal and the vehicle runs.

Look out

Do not keep your foot on the clutch pedal while running.

Hydraulic drive forklift

- Press the brake pedal and operate the front/rear reversing switch
- Release hand brake
- Release the brake pedal, press the accelerator pedal, and the vehicle runs.

Shift gears

Mechanical forklift truck

- Stop vehicle before shifting.
- depress the clutch pedal, flip the shift lever, release the clutch pedal, and press the gas pedal.

Hydraulic drive forklift

- Stop the vehicle before shifting.
- Flip the shift lever.

retard

Mechanically driven forklift truck

Mechanical gearbox with synchronizer, release the accelerator pedal, the clutch pedal to the end, shift lever in I position, release the clutch pedal, increase the accelerator.

Hydraulic drive forklift

Release the gas pedal slightly and, if necessary, depress the brake pedal.

swerve

Forklifts are different from ordinary vehicles in that they are rear-wheel steering, and the rear counterweight rotates outward when steering.

Slow down and turn the steering wheel to the side you want to turn, turning the steering wheel slightly ahead of the front wheel steering vehicle.

Pull up

① Slow down and press the brake pedal to stop the car (the mechanical forklift clutch is also pressed).

② Shift handle in neutral.

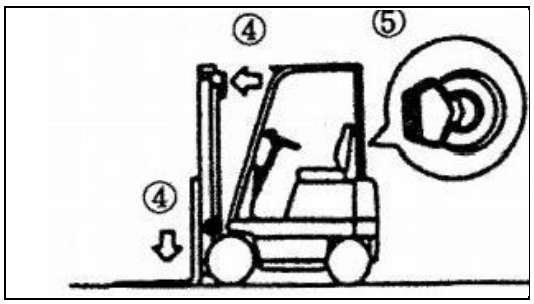
③ Pull the overhand brake.

④ The fork is on the ground, the gantry is tilted forward.

⑤ Key switch "0" position, turn off the engine, diesel forklift pull the engine flout pull rod, take off the key and keep it.

Look out

- **Get off carefully and don't jump**
- **Vehicles cannot be parked on the running route**



4、stowage

●Adjust the spacing between forks to balance the goods.

●The vehicle is facing the goods for loading.

●The pallets should be placed symmetrically on the forks.

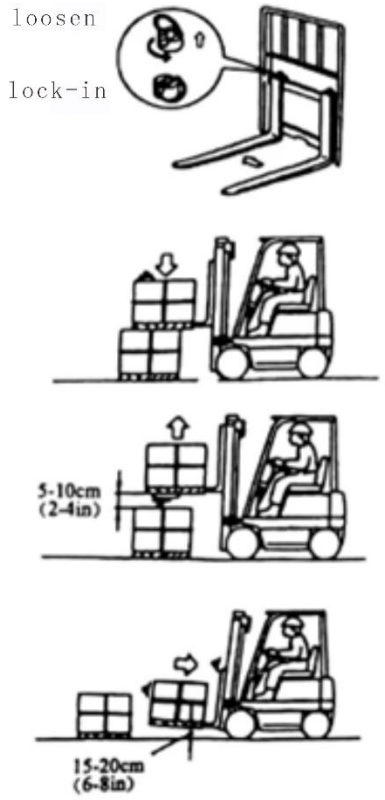
●Fork as far as possible into the tray.

●delivery of goods:

① First lift the fork 5cm~10cm from the ground to confirm whether the goods are firm.

② Then the door frame leans back into place, lifts the goods 5cm~10cm from the ground, and then starts to drive.

●Handling large volumes of goods is obstructing the sight, except for climbing, reverse driving.



5、stacking

●Slow down as you approach the cargo storage area.

●The vehicle is parked directly in front of the goods storage area.

●Check the condition of the storage site.

●Tilt the gantry forward to fork level, raising the fork slightly above discharge position.

●Proceed, place cargo in discharge position and stop.

●After confirming that the goods are directly above the unloading position, lower the fork slowly and confirm that the goods are safely in place.

●Perform the necessary lifting and tilting operations, and the reversing forklift removes the fork from the cargo.

●Ensure that the prongs are removed from the cargo, and lower the prongs to a position between 15cm and 20cm above the ground.

●Door frame tilt back into place.

Look out

1、When the load is raised more than 2m, do not tilt the door frame.
2、When the load is high, do not exit or leave the vehicle.

6、unbundling

●Slow down when the forklift truck approaches the delivery yard.

●Stop the forklift 30cm away from the cargo.

●Check the condition of the goods.

●Tilt the gantry forward to fork level and lift the fork to pallet or tie position.

●Ensure that the forks are aligned with the tray and move slowly. Insert the forks into the tray as far as possible before stopping.

Look out

If it is difficult to fully insert the fork, the forward vehicle should insert the fork 3/4 of the way. Lift the fork 5cm~10cm, back 10cm~20cm, and then drop the tray or tie, and then completely insert it.

●Lift the fork 5cm~10cm away from the stack.

●Look around the vehicle to make sure it is barrier-free and back up slowly.

●Drop the fork 15~20cm off the ground, tilt the door frame back into place, and then transport to the destination.

Ⅱ、maintenance

For more detailed maintenance, see the Periodic Maintenance and Lubrication Table.

1、Daily maintenance

Daily maintenance also doubles as a pre-drive check.

1. Leakage check: electrolyte, hydraulic oil, coolant, hydraulic transmission oil

> **warn**
>
> **Do not start the vehicle if fuel leakage is found before work, and start the engine after removing the leakage.**

Check the engine, hydraulic fittings, water tank and drive system for oil or water leakage by hand touch or visual inspection.

2. Visual inspection

Check whether the lights and instruments are normal.

Check for loose tires, air pressure, bolts.

Check whether the tire is damaged and the tire pressure is normal.

3. Fuel check

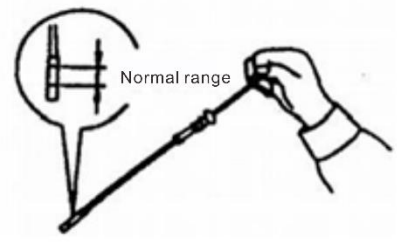
Fuel tank cap

The fuel gauge is installed on the instrument panel and checks the oil level daily. Fill up the tank after work every day. The fuel filling port is located on the left leg of the top guard frame.

4. Check engine oil level

> **Look out**
>
> - **Place the forklift on the level ground to check the oil level.**
> - **The cooler can accurately check the oil level.**

First pull out the oil scale, clean the ruler, reinsert and pull out, check whether the oil level is between the two scale lines.



5. Engine coolant flow check

In the engine cooling state, observe the position of the coolant attached to the tank. If the value is lower than MIN, add the value to MAX. If there is no coolant in the attached tank, check the amount of coolant in the tank. If the amount of coolant in the tank is insufficient, the coolant should be added to the tank to the tank cover, the freezing point of which is -36.5 ° C, and the coolant should be added to the attached tank to the "MAX" position.

Look out

- **When adding water to the tank, use clean tap water. If antifreeze is used, the same antifreeze should be added.**
- **Special attention should be paid to the water tank and cooling system during the hot season.**

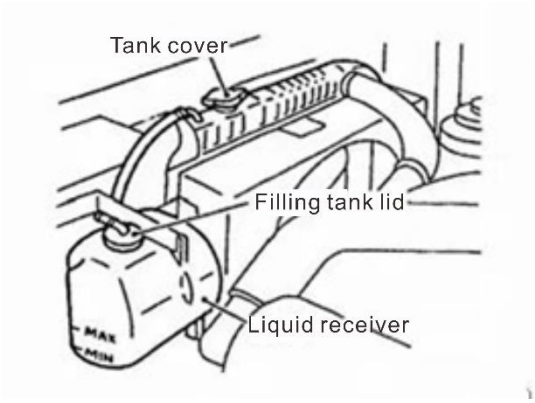
Look out

1 、 When the engine water temperature is higher than 70 ° C, please do not open the tank cover. Press down on the lid and slowly turn to the left to allow steam to escape. Put on a thin cloth and unscrew.

2、Do not wear gloves to twist the water tank cover, to prevent misoperation of high pressure hot water scalding hands.

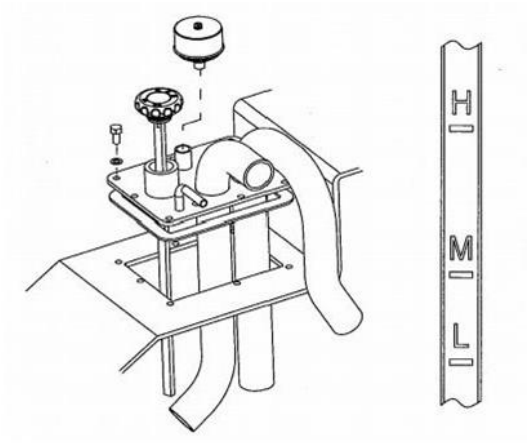
3 、 Antifreeze contains harmful substances to the human body, if accidentally swallowed, immediately induce vomiting and go to the hospital.

4 、 Keep children away from antifreeze.



6. Hydraulic tank oil level check

Check the oil level of the hydraulic tank.



The L scale line indicates the lower limit of the liquid level, and the liquid level must be higher than the current level for models equipped with a frame below 4 meters (including 4 meters).

The M scale line indicates the lower limit of the high door frame, and the liquid level of the vehicle equipped with 4 meters door frame and the vehicle equipped with the vehicle must be higher than the current degree.

The H scale indicates the hydraulic oil limit, but the vehicle type is allowed to exceed this limit.

7. Brake fluid level check

Check the brake fluid cup. Check whether the amount of brake fluid is within the scale range, if the amount of liquid is insufficient, please add, and check whether the brake pipe is mixed with air.

Look out

1、When filling brake fluid, prevent dust and water from mixing into the oil.

2、Brake fluid is toxic, corrosive, once in contact, please rinse.

Brake fluid replacement

See "Semi-annual maintenance (1000 hours)"

8. Lighting inspection

Make sure the key switch is in the on position and the light is on.

9. Turn signal check

Turn the turn signal control handle to check whether the turn signal is normal.

10. Handbrake check

The vehicle is driving slowly, pull the overhand brake handle, and the vehicle is stopped by the brake. The vehicle is required not to deviate.

11. Reverse lights and reverse buzzer check

Shift lever set to **R**, car light, reverse buzzer。

12. swerve

①The traffic moved at a slow speed.

②Turn the steering wheel three times from left to right.

See if the left and right steering forces are roughly the same.

13. megaphone

Press the horn button to check whether the sound is normal.

14. Seat adjustment, seat belt check

Pull the seat adjusting lever backwards, adjust the seat to the comfortable position of hands and feet, release the seat adjusting lever and lock it.

Check that the seat belt is in order.

15. Shift handle

Check that the shift handle is loose and that the shift is smooth.

16. Lifting handle, tilt handle, accessory handle

Check whether the lifting handle, tilt handle and accessory handle are loose, and whether the return is good.

Increase the engine speed, respectively operate the lifting handle, tilt handle, accessories handle, to ensure that the fork can be fully lifted, lowered, and tilted back and forth door frame.

17. Instruments and sensors

Check the timing meter, water temperature meter, oil temperature meter, transmission oil temperature sensor, fuel sensor, engine water temperature sensor, oil pressure sensor, etc., is normal.

18. Clutch pedal, brake pedal, micro-pedal check

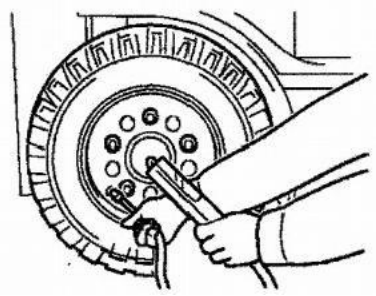
Press the clutch pedal and the clutch should be completely detached.

Drive the vehicle slowly and press the brake pedal. When the brake pedal is pressed, the brake light is on.

Drive the vehicle slowly, press the micro-pedal, and check whether the micro-pedal function is normal.

19. Tire inspection and tire pressure detection

After confirming that there is no air leakage, screw on the cap, check whether the ground and side of the tire are damaged, and whether the rim is deformed.



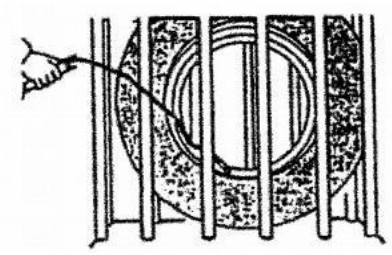
Unscrew the cap counterclockwise and measure the tire pressure with a barometer. If insufficient, replenish the air pressure to the specified value.

warn

Forklift tires need high air pressure to carry, small deformation of the rim or tire ground damage will cause accidents.

When using air compressor, the pressure should first be adjusted, the pressure is shown in the following table, because the maximum output pressure of the air compressor is much higher than the specified pressure of the tire, otherwise it will cause serious accidents.

For safety, place the tire in a protective frame when inflating.



Tire pressure adopts new standard GB/T2982-2014:

Vehicle type	Drive wheel (front wheel)	Steering wheel (rear wheel)
1t-1.8t	790kPa	790kPa
2t-2.5t	860kPa	860kPa
3t-3.5t	830kPa	790kPa
4t-X5t	830kPa	860kPa
5.5t	930kPa	860kPa

2、Weekly maintenance (40 hours)

Add the following content on the basis of daily maintenance

1. Air filter maintenance

Usually: when the vehicle works for 50~250 hours, please maintain the filter element.

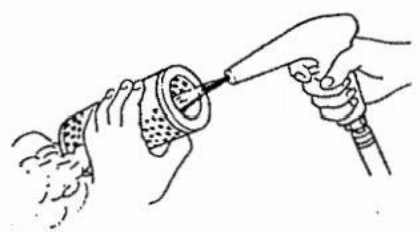
Replace the filter element after six times of maintenance.

Look out

If your vehicle is used in harsh conditions, ensure that the cycle of replacing the filter element should be more frequent.

In the harsh working environment with more dust, the maintenance and replacement cycle of the filter should be shortened according to the situation, and it is recommended to maintain it every 8 hours to every 50 hours, and replace the new filter every 100 to 300 hours accordingly.

1.8t~ 5.5t maintenance method:



①Remove the air filter end cover;

②Take out the main filter element, safety filter element, separate;

③The main filter element is the outer filter element: use the compressed air hammer to clean the dust inside and outside the main filter element.

④ The safety filter element is the inner filter element: clean with hand beating, avoid blowing with air. Special attention.

Look out

1、Dust will fly into your eyes, so you should wear protective goggles before blowing.

2 、 If the filter element is not maintained and replaced according to the requirements, the engine will be damaged in advance.

Model with air filter maintenance indicator (optional):

刻 度 线 ： 发 动 机 进 气 阻 力

Indicator window	Engine intake smooth condition
yellow	Smooth intake, no maintenance for the time being
Yellow + Red	Air intake is slightly blocked and needs maintenance
Red Or scale greater than 6.2kPa	The intake air is severely hindered, and the main filter element must be maintained or replaced

① When maintaining the main filter element, it is not necessary to remove all the filter element, and the safety filter element does not need to be maintained;

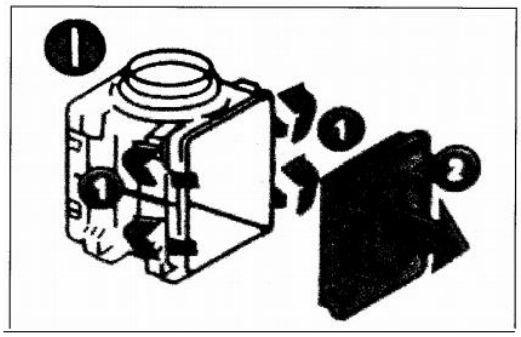
② The main filter has been maintained for 3 times or the indicator window still shows red after maintenance, and the main filter and safety filter should be replaced at the same time.

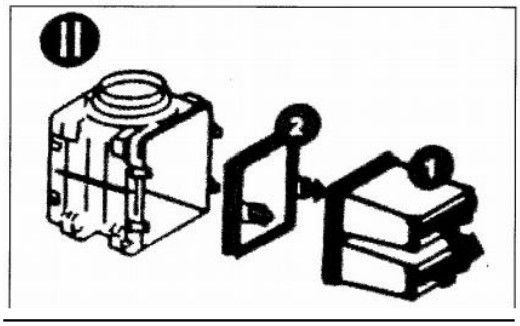
③ After maintenance or replacement

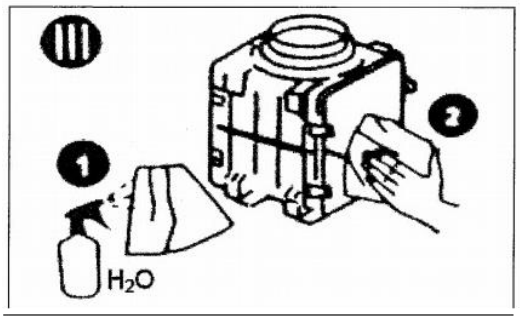
of the filter element, press the top of the indicator to reset.

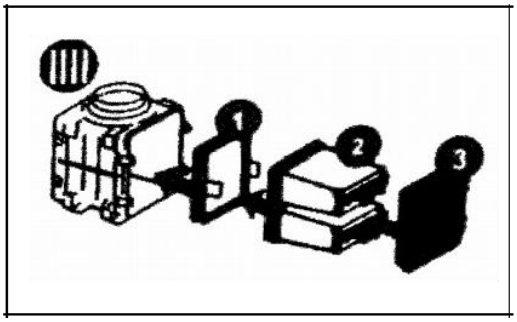
Button to reset the indicator window.

4.0t-X5.0tW58 model maintenance method:









①Open the four clasps on the air filter inspection cover;

②Hold the clasp in your hand and pull the lid outward;

③ Gently shake the main filter element from side to side with both hands and slowly pull out the main filter element;

④ Safety filter element no maintenance. If you need to replace the safety filter, gently shake the filter from side to side and slowly pull out the filter;

⑤Wipe both sides of the inside of the cylinder with cloth, so as not to affect the installation and sealing effect;

⑥Check the safety filter element and install it into the cylinder;

⑦Check the main filter element and install it into the cylinder;

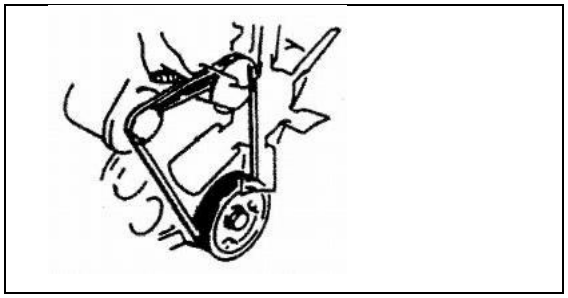
⑧Close the lid and make sure the dust cover stays down;

⑨Lock the clasp. Assembly complete.

warn

If the filter element is not maintained and replaced in time as required, the engine will be damaged in advance.

2. Fan belt



Turn off the engine。

Use your fingers to apply 10kg downward force in the middle of the two belts to check whether the droop is in line with the specified value.

engine	Droop (mm)
1.0t-3.5t	
K21,K25	11-13
4TNE92 4TNE98	new 8-12(<5min) old 10-14(≥5min)

4TNV94L	new 5-8(<5min) old 7-10(≥5min)
C240	8-12
S4S	12

Use your fingers to apply **4kg-5kg** downward force in the middle of the two belts to check whether the droop is in line with the specified value。

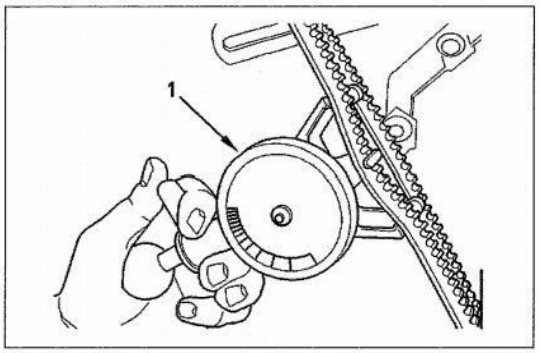
engine	sag (mm)
4D27XG31 4D32XG31 4D32RG30 4D32XG40 CY4BG531 4D35Y41 YCF3657-T480	10-15

Use your fingers to apply 6kg force downward in the middle of the two belts to check whether the droop is in line with the specified value.

engine	sag (mm)
GM4.3L	≤13

Perkins 1104D engine: Check

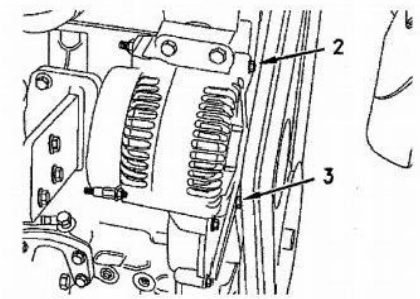
To accurately check belt tightness, use a suitable gauge.



Install the belt tensiometer (1) in the center of the longest free length and check the tension. The correct tension of the new belt is 535N. If the belt tension is below 250N, adjust the belt to 535N.

If installing two belts, check the tension of both belts and adjust the tension of the tighter belt.

Perkins 1104D engine: Tuning



1. Loosen the alternator pivot bolt (2) and bolt (3)

2. Move the alternator to increase or decrease belt tension. Tighten alternator pivot bolt and connecting rod bolt to 22N·m

QSB3.3 、QSB4.5 、QSF2.8 、F2.8CS449 Cummins engine with automatic tensioning wheel, fan belt tightness without adjustment.

Look out

If the belt has been stretched, has not been adjusted or is cut or cracked, it should be replaced.

The engine has not stopped running, and the droop of the belt cannot be checked to prevent finger clamping or cuff entanglement.

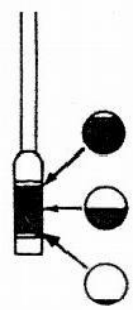
Look out

1、If the belt has been stretched, has not been adjusted or is cut or cracked, it should be replaced.

2 、 The engine has not stopped running, and the droop of the belt cannot be checked to prevent finger clamping or cuff entanglement.

3. Hydraulic transmission oil level

Open the check cover and pull out the oil scale to check that the oil level is between the scales.



4. Door frame and fork inspection

Check the gantry and fork to make sure:

①There is no crack and bending of the fork, and the fork is firmly and correctly installed on the fork rack;

②Check whether there is oil leakage in the cylinder and tubing;

③Check the roller rotation;

④Check the door frame for cracks and deformation;

⑤Operate lifting, tilt and tool handle to check whether the door frame works normally and whether there is abnormal noise.

5. Chain tension check

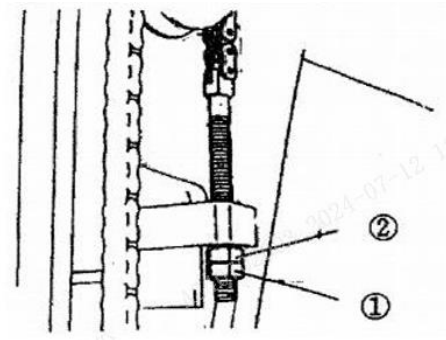
①The fork is raised 10cm-15cm, and the door frame is vertical.

②Press the middle of the chain with your thumb to check whether the tightness of the left and right chains

is consistent.

③ Tension adjustment: loosen the locking nut 1, screw the nut 2 Adjust the chain so that the tension of the two chains is the same, and then tighten the locking nut 1.

10-15cm

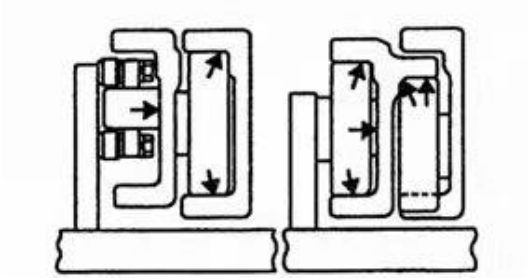


6. Gantry lubrication

Periodically lubricate the following parts according to the requirements of the regular maintenance and lubrication project chart.

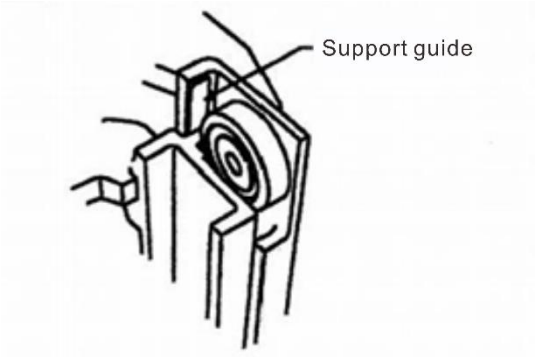
①The interval period of lubrication should be changed according to the operating conditions. During busy months, the number of lubricated parts should be increased.

②With the operation of the forklift, apply a layer of grease to the contact surface of the lifting guide wheel and the inner and outer door frame.



Gantry

Apply a layer of grease to the supporting guide rail.



warn

When adding grease, park the forklift on a flat road, turn off the engine and pull the overhand brake. Prevent hand and body from being caught when filling, and prevent falling when high lubrication.

7. Chain lubrication

Apply engine oil to the left and right chains with a brush.

8. Grease the following parts, the specific parts of the filling see

《Lubrication system drawing》

① Door frame seat bearing lubrication:

②Microbrake pedal lubrication:

③ Steering axle support shaft lubrication;

④ Steering knuckle spindle lubrication;

⑤Steering link pin lubrication;

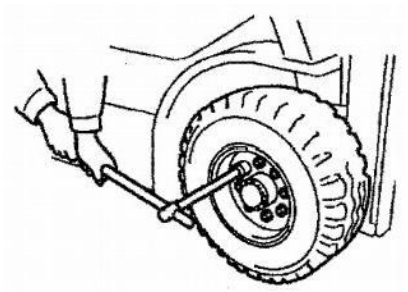
⑥ Steering cylinder pin lubrication.

9. Bolt and nut fastening

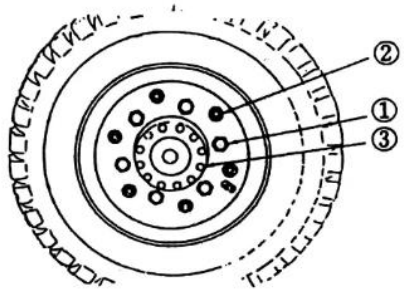
See Maintaining the Periodic Table.

10. Tire nut tightening torque check

Check whether the tightening torque of the hub nut meets requirements.



Drive wheel (front wheel)



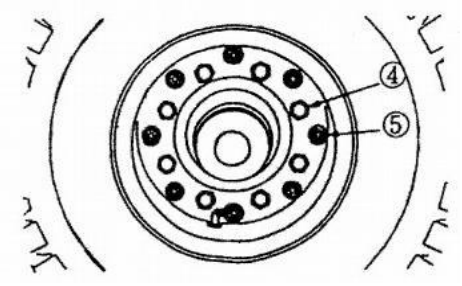
② Hub nut

②Split rim bolts (1-1.8t only)

③Half-shaft bolt

	tonnage	Tightening moment N·m
hub nut	1.0-1.8t	157-176
	2.0-3.5t	363-490
	4.0-X5.0t	441-558

Steering wheel (rear wheel)

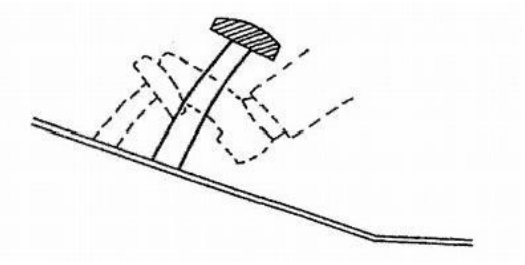


④Rear hub nut

	tonnage	Tightening moment N·m
hub nut	1.0-1.8t	78-98
	2.0-3.5t	157-176
	4.0-X5.0t	363-490

⑤Split rear rim bolt

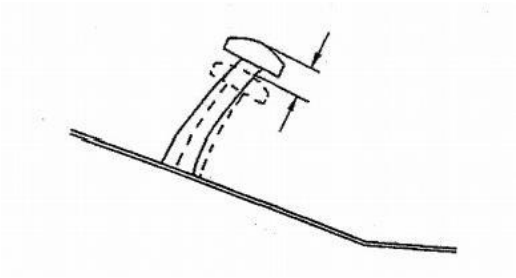
11. Brake pedal, micropedal, clutch pedal check



When the engine is still running, press the brake pedal completely, and the distance between the surface of the

brake pedal and the front floor should be more than 60mm.

Check the height of the micro-pedal and clutch pedal in the same way.



1.0t-3.8tHeight and free clearance: mm

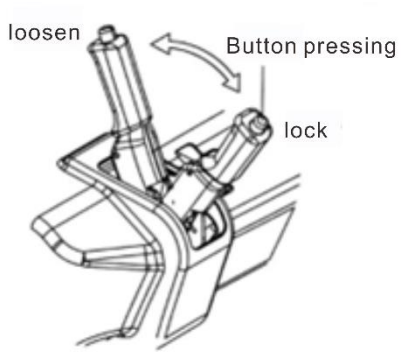
	Altitude	Free gap	footboard Idle stroke
Brake pedal	135±5	1-3	1-3
micropedal	135±5	Micropedal contact Bolt - brake pedal: 0mm	
Clutch pedal	35+5	2-5	30-40

4.0-X5.0t Height and free clearance: mm

	Altitude	Free gap	footboard Idle stroke
Brake pedal	140±5	1-3	1-3
micropedal	140±5	Micropedal contact Bolt - brake pedal: 0mm	
Clutch pedal	140±5	2-5	24-30

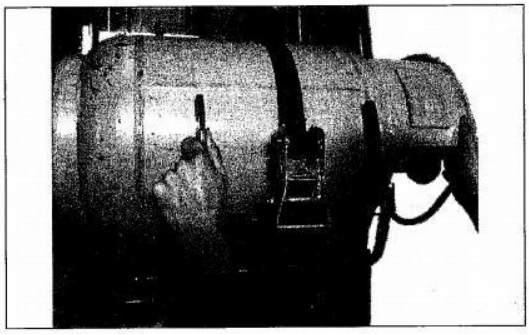
12. Hand brake

Ensure that the hand brake is tightened and then loosened to return to the original position with good efficacy, and the tension requirement is 245~295N。



13. Cylinder support check

Pull the cylinder outside, check whether it is firm, restore the position, check whether it is stable.



3、Maintenance every month and a half (250 hours)

Add the following maintenance on the basis of weekly maintenance.

1. Engine oil and oil filter changes (first 100 hours, then every 250 hours)

① Start the engine, warm it up, and then turn it off.

② Remove the oil filler cap and oil pan drain plug and release the oil.

Look out

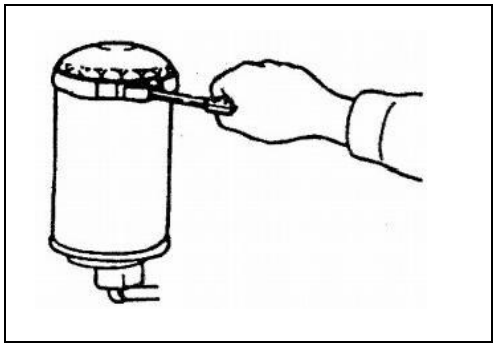
The engine oil can be very hot. Be careful not to burn yourself.

• Emulsion oil indicates that the oil is mixed with coolant and should be sought Find reasons to correct.

• Very thin oil indicates that the oil contains gasoline.

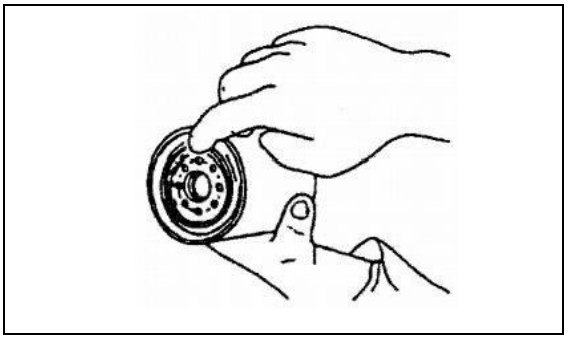
③ Wipe and install drain plug and gasket. Oil drain plug tightening torque:29Nm~39Nm

Remove the oil filter with a tool



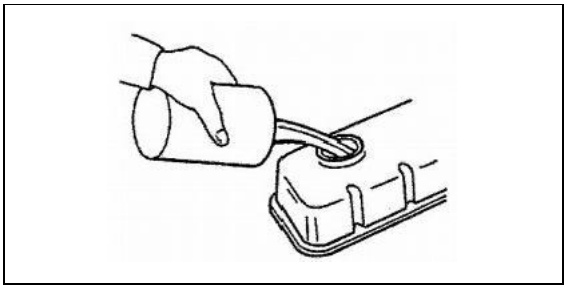
⑤ Wipe the oil filter mounting surface with a clean cloth.

⑥ Apply a small amount of oil to the rubber ring of the new oil filter.



⑦ Install a new oil filter, only by hand, can not use a wrench to tighten.

⑧ Refer to forklift oil list, fill recommended oil.



⑨ Start the engine and check the area around the drain plug and oil filter for oil leaks. If there is significant leakage, the part is not properly installed.

⑩ Fully preheat the engine, then turn off the engine and check the oil level for a while. If necessary, add. When checking the oil level of the machine, park the forklift on the level ground.

2. Grease the front and rear pins of tilting cylinder

Wipe the filling point clean and

then squeeze out the old oil.

3. Check the gear oil for the drive axle housing and add it if necessary

If the working environment is dusty, then it is recommended that the user use for 200 hours, you need to consider replacing the gear oil in the drive axle housing for the first time.

4. Change transmission oil filter (first time only, then every six months)

Check the fluid condition of the hydraulic transmission, combined with the use of the environment, such as the working environment is dusty, the hydraulic oil of the hydraulic transmission should be replaced. This is only the first replacement.

① Stop the forklift on the level road, lower the fork to the ground, tilt the door frame back, tighten the hand brake handle, put the gearbox in neutral, and turn off the engine.

Look out

Hot hydraulic oil and hydraulic oil and parts may burn the human body. Do not contact hot hydraulic oil and parts with the skin.

② Remove rubber pad and front bottom plate.

③ Remove the oil filter and dispose of it according to local regulations.

④ Wipe the oil filter base and make sure the old washer on the base is clean.

⑤ Apply a small amount of hydraulic oil to the new cartridge washer. Install the oil filter by hand. When the oil filter touches the base, tighten 1/2 to 3/4 turns.

5. Change the fluid in the hydraulic transmission (first time only, every year thereafter)

Stop the forklift on the level road, lower the fork to the ground: tighten the handbrake handle, put the gearbox in neutral, and turn off the engine.

Look out

Hot hydraulic oil and hydraulic oil and parts may burn the human body. Do not contact hot hydraulic oil and parts with the skin.

① 1 container under the gearbox (volume of more than 20 liters).

② Remove the oil plug and place the oil into the container.

③ Clean the drain plug and install it.

④ Remove dipstick, fill with hydraulic oil (see "Forklift Oil List"), and put the dipstick back.

⑤ Start the engine. Depress the brake pedal while idling the engine and putting the gearbox in forward and

backward positions to fill the clutch.

⑥ Put the gearbox in neutral and tighten the hand brake.

⑦ Remove the dipstick and observe the liquid level. If the oil is insufficient, the hydraulic oil is added to keep the oil level between the maximum and minimum scale.

⑧ Check filter and drain plug for leakage.

⑨ Turn off engine and install front baseplate.

6. Fuel system exhaust [Diesel vehicle]

Exhaust the air in the fuel system pipeline under the following conditions:

- after running out of fuel and filling the fuel tank.
- after performing fuel system maintenance such as replacing the fuel filter and draining the fuel filter/oil-water separator or replacing the fuel system components.

> **Look out**
>
> **Once air enters the fuel system, it must be discharged before the diesel engine starts.**

Exhaust operation with electric fuel pump:

① Place a suitable container under the vent.

② Loosen the vent 2 or 3 turns.

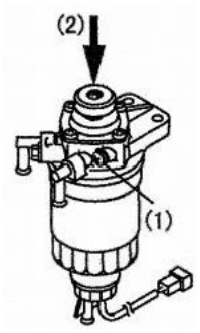
③ Turn the key to the ON position for 10 to 15 seconds or until bubble-free fuel flows from the vent.

④ Tighten the vent.

⑤ Wipe the spilled fuel and dispose of it properly.

⑥ Do not use a starter motor to start the engine by filling the fuel system. This can lead to overheating of the starter motor and damage to coils, pinion and/or gear rings.

Manual exhaust control:



① Place a suitable container under the vent.

② Loosen the vent (1)2 or 3 turns.

③ Operate the injection pump (2) until bubble-free fuel flows from the vent.

④ Tighten the vent.

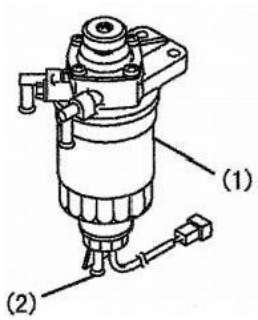
⑤ Wipe the spilled fuel and dispose of it properly.

⑥ Do not use a starter motor to start the engine by filling the fuel

system. This can lead to overheating of the starter motor and damage to coils, pinion and/or gear rings.

7. Drain water in oil-water separator [Diesel vehicle]

If the fuel filter alarm light is on during engine operation, drain the water.



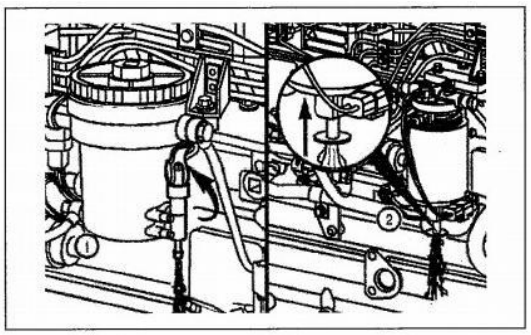
① Place a suitable container under the oil filter to collect dirt;

② Drain the water knob (2) at the bottom of the fuel filter to drain all the accumulated water inside;

③ Tighten the drain cock;

④ After these operations, be sure to fill the diesel system with oil.

Cummins diesel:



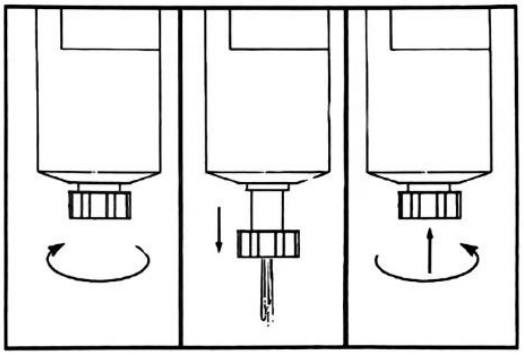
Can type:

①Turn off the engine;

②Place a container under the fuel filter;

③ Lift the drain valve control lever until the liquid is completely drained from the drain pipe until clean fuel is visible;

④Push the drain rod up until the liquid is completely discharged from the drain pipe.



Rotary type:

① Turn off the engine;

② Place a container under the fuel filter;

③ Open the drain valve by hand. Turn the valve counterclockwise about 3.5 turns until the valve drops 25.4mm and starts to drain;

④ Drain the oil water separator until you see clean fuel.

Look out

Do not over-tighten the drain valve when closing it. Excessive tightening will damage the thread. To close the valve, lift the valve and turn it clockwise until you tighten it by hand.

8. Exhaust inspection

colourless	Full combustion - normal
black	Incomplete combustion - abnormal
blue	Burning oil -- not normal
white	Combustion chamber water - abnormal

warn

Do not run the engine in a place with poor ventilation conditions, the exhaust contains carbon monoxide, which can cause poisoning.

9. Battery and its electrolyte check

See details《Methods for use and maintenance of lead-acid batteries》。

4、Semi-annual maintenance (1000 hours)

Add the following maintenance on the basis of monthly maintenance.

1. Brake fluid replacement (1.0t-X5.0t)

① When the vehicle stops at the designated maintenance place, stop the forklift on the level road, lower the fork to the ground, tighten the hand brake handle, put the gearbox in neutral, and turn off the engine.

② Remove the rubber dust cap on the oil drain port, install both ends of the prepared transparent hose respectively in the oil drain port and waste oil collection bottle, and then use a wrench to loosen the screw of the oil drain port in a counterclockwise direction, while another person on the car repeatedly steps on the brake pedal. At this time, brake oil will spray from the oil outlet, pay attention to the liquid level in the brake fluid storage tank, and add new brake fluid as the liquid level drops. Tighten the oil outlet screw when the oil is clear.

③ People on the car repeatedly step on the brake pedal to the highest point and step on the brake pedal do not loosen the foot, the driver loosen the oil port screw, tighten it after the brake oil is sprayed and notify the car to loosen it. This operation is repeated several times until there are no bubbles in the brake oil released. Pay attention to the liquid level in the brake fluid storage tank, and add new brake fluid as the liquid level drops.

Look out

When filling brake fluid, prevent dust and water from mixing in it.

Brake fluid is toxic, corrosive, once in contact, please rinse.

2. Steering wheel lock lubrication

Grease the steering wheel lock out.

3. Check, clean and replace hydraulic return oil filters, respirators and screens

Stop the forklift on the level road, lower the fork to the ground, tilt the door frame back, tighten the hand brake handle, put the gearbox in neutral, and turn off the engine.

① Loosen the bolts on the cover assembly on the hydraulic tank

② Remove return oil filter from top cover plate.

③ Install the new return oil filter by hand.

④ Remove the suction filter from the fuel tank.

⑤ Install a new strainer by hand.

⑥ Install tank top cover and tighten bolts.

⑦ Remove the respirator, clean and dry the individual air filters of the respirator with a clean, non-flammable detergent.

⑧ Put on a respirator.

⑨ Start the engine and operate the hydraulic system so that the hydraulic oil fills the entire system. Check for leaks.

⑩ Turn off engine to check oil level. Retract all cylinder rods to keep the oil level between the dipstick scales.

4. Check, clean and replace the fuel filter

> **Look out**
>
> **In dusty or other dirty operating environments, clean the fuel filter monthly and replace it every six months.**

① Remove fuel filter assembly

② Remove the sensor assembly from above

③ Before installing a new one, install the existing sensor assembly to give the filter seal a bit of clean fuel

> **Look out**
>
> **Do not fill the filter with fuel before installation, otherwise it will accelerate the wear of the fuel system components.**

④ Install the new filter assembly

⑤ Turn the new filter until the gasket is attached to the sealing surface

⑥Tighten another 2/3 turns

5、Maintenance per year (2000 hours)

On the basis of semi-annual maintenance, add the following maintenance。

1. Hydraulic oil change

Stop the forklift on the level road, lower the fork to the ground, tilt the door frame back, tighten the hand brake handle, put the gearbox in neutral, and turn off the engine.

Look out

Hot hydraulic oil and hydraulic oil and parts may burn the human body. Do not contact hot hydraulic oil and parts with the skin.

① A container (with a volume of more than 60 liters) is placed directly below the hydraulic oil tank. Remove the oil drain plug of the hydraulic oil tank and discharge the hydraulic oil into the container.

② Remove hydraulic dipstick and hydraulic tank cover.

③ Remove the magnet in the oil tank to clean, and rinse the oil outlet at the bottom of the tank with hydraulic oil.

④ Clean and install drain plug.

⑤ Fill the hydraulic tank. See "Forklift Oil List". Install hydraulic tank cover and dipstick.

⑥ Start the engine and operate the multiway valve lever and steering system to fill the system with hydraulic oil.

⑦ Check the hydraulic components and pipelines for oil leakage.

⑧ Turn off the engine, retract all cylinder rods, and check the oil level of the hydraulic tank. Add oil to the scale.

2. Replace the fluid in the hydraulic transmission

See "Changing Hydraulic Transmission gear) fluid Oil" in "Monthly Maintenance".

3. Replace the grease on the front wheel bearing

vide《Maintenance manual》Drive axle hub content,Disassemble the hub bearing, Then replace the grease.

4. Replace rear wheel bearing grease

vide 《 Maintenance manual 》 The contents of the steering bridge.

5. Replace the drive axle gear oil

Stop the forklift on the level ground. Set to medium, engine off.

① Remove the lower oil plug and place the oil into a container. Clean the drain plug.

② Install drain plug

③ Remove the vent plug and oil

position plug. Fill the drive axle housing with oil from the curved plug seat hole until oil overflows from the horizontal jack hole. See "Refill volume".

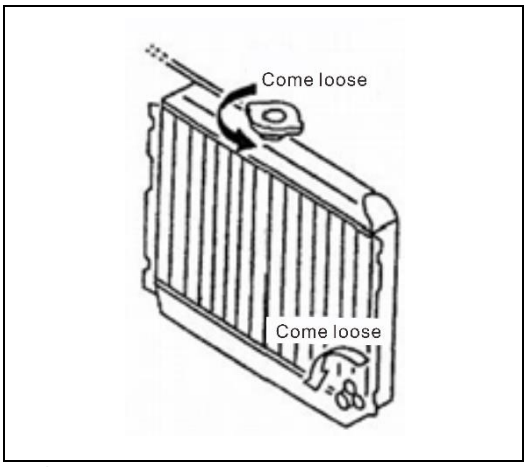
④ Install horizontal plug and curved plug seat.

⑤ Start the forklift. Set the engine to idle with the direction control handle in the middle position.

⑥ Remove the horizontal plug. Hold oil level until oil spills.

6、Maintenance every two years (4000 hours)

1. Engine coolant replacement (2 to 4 years replacement)



① Open the tank cover and drain cock to drain the coolant, then flush the cooling system.

② Tighten the drain cock.

③ Fill the tank with coolant to the filling port.

④ Get the engine running at full capacity.

⑤ Stop the engine, and when it is completely cooled, refill the water tank with coolant to the filling port, and refill the storage tank with coolant to the "MAX" position.

⑥ Check the drain cock for leakage.

warn

To avoid the risk of burns, do not replace the coolant when the engine cooling temperature is higher than 70 ° C.

The engine coolant added is antirust and antifreeze coolant. see 《Forklift oil list》

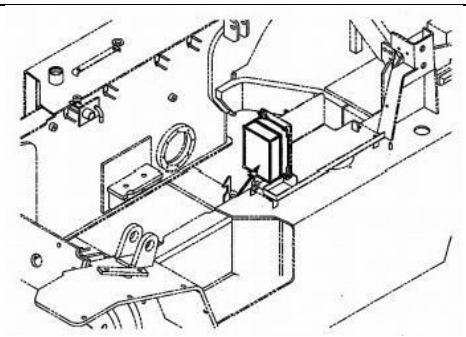
7、other

1. Fuses, relays

① Before replacing any faulty fuses or relays, find out the cause first.

② Apply fuse replacement to specified specifications.

The forklift control box is housed in the internal-combustion hood on the left side of the engine.

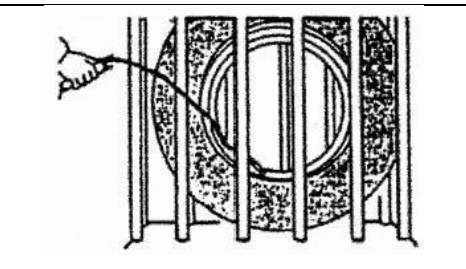


2. Tire change

warn

When using air compressor, the pressure should first be adjusted, because the maximum output pressure of the air compressor is much higher than the specified pressure of the tire, otherwise, it will cause serious accidents.

For safety, place the tire in a protective frame when inflating.



Front tire

① Place the forklift on a level, solid ground;

② Start the engine and raise the gantry about 100mm;

③ Place wooden pads on the rear of the rear wheels to prevent the forklift from moving;

④ Loosen each nut of the wheel 1-2 turns counterclockwise;

⑤ Tilt the gantry back and place it on both sides of the outer gantry with wooden cushions;

⑥ Tilt the gantry forward until the front wheels are raised to the ground;

Look out

Do not loosen the nut until the front wheel is lifted off the ground.

⑦ Place wooden blocks on each side of the front of the forklift frame to support the forklift, and then turn off the engine.

⑧ Remove the wheel nuts and replace the front wheel.

Look out

1、When removing the tire from the hub, the rim bolts and nuts can be removed only after the air has been deflated;

2、The block should be solid and solid enough;

3、When the wooden block is used to support the forklift, it must not go under the forklift.

⑨ Install the nuts in the order of the drawing and temporarily lock the

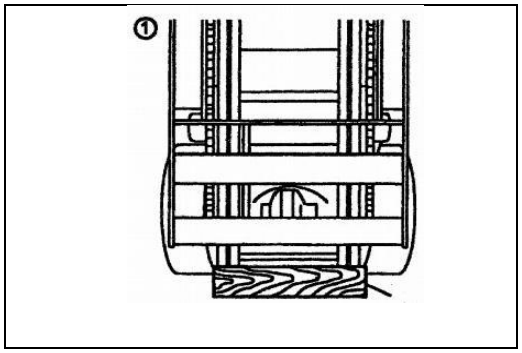
nuts.

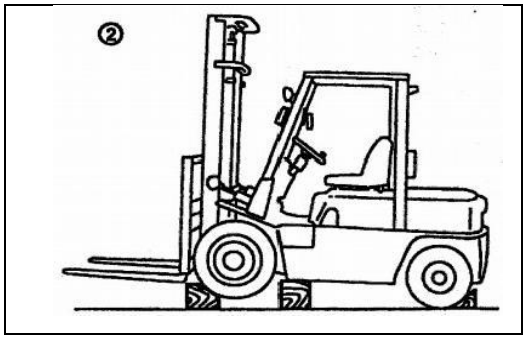
⑩ Start the engine and remove the wooden pad from under the frame.

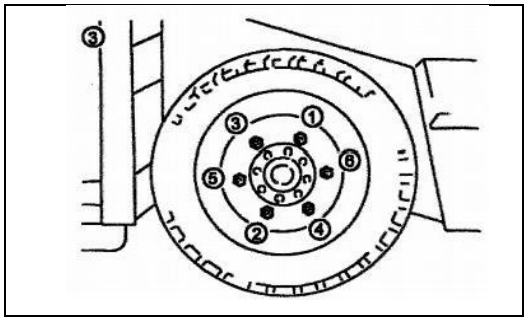
⑪ Tilt the door frame backward so that the forklift truck slowly lowers, and then remove the wooden pad under the door frame and at the rear wheel.

⑫ Tighten the tire bolts in symmetrical cross batches one by one.

⑬ Adjust the tire pressure to the specified value.







Rear tyre

① Park the forklift on a level and solid ground.

② Tighten the hand brake and place wooden pads behind the front wheels to prevent the forklift from moving.

③ Place the jack on the section of the bottom of the counterweight as shown.

Look out: Ensure that the minimum weight of the jack is 2/3 of the total weight of the forklift.

④ Loosen the nut on the wheel 1 or 2 turns in a counterclockwise direction.

Look out

Do not remove the nut before lifting the rear wheel off the ground.

⑤ Use a jack to slowly lift the forklift until the rear wheels are completely off the ground. As shown in the figure, wooden pads are placed on the rear ends of both sides of the forklift to support the forklift.

⑥ Remove wheel nuts and replace rear tire.

Look out

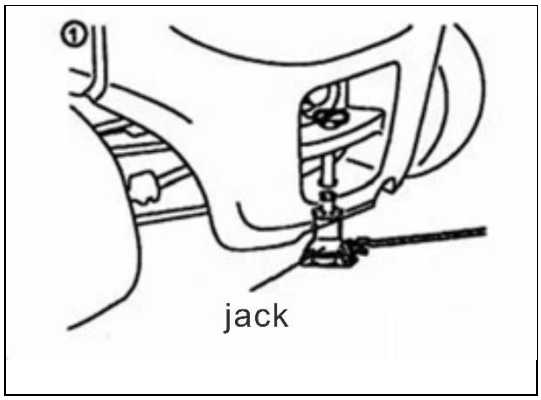
1、When removing the tire from the hub, the rim bolts and nuts can be removed only after the air has been deflated;
2、Make sure the wooden pad used to support the forklift is solid and solid enough;
3、When the forklift is supported only with a wooden pad, it must not go under the forklift.

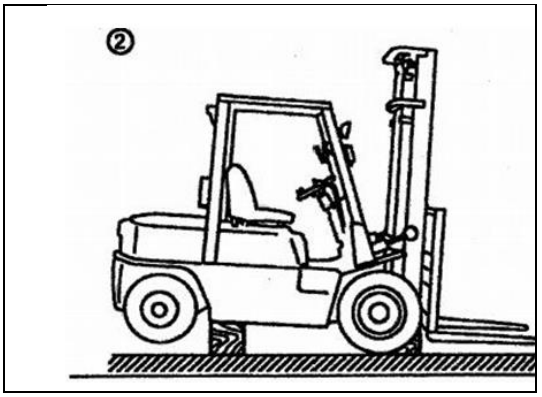
⑦ Install the nuts in the order shown in the drawing and temporarily lock the nuts.

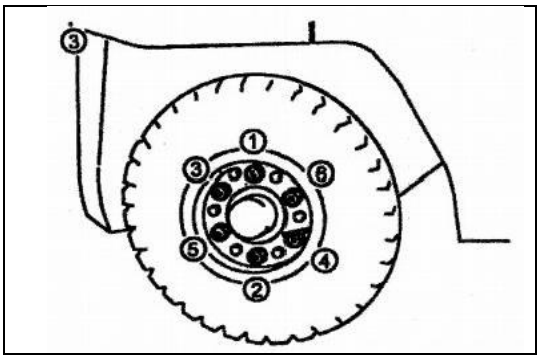
⑧ Remove the wooden pad under the frame, slowly lower the forklift to the ground, and remove the wooden pad and jack behind the front wheel.

⑨ Tighten the nut to the specified torque in a cross-facing manner. Refer to the "Tightening Torque" table.

⑩ Adjust the tire pressure to the specified parameters.







3. Measures to cope with cold and heat

Choose the right viscosity oil according to the ambient temperature.

4. Clean the heat sink

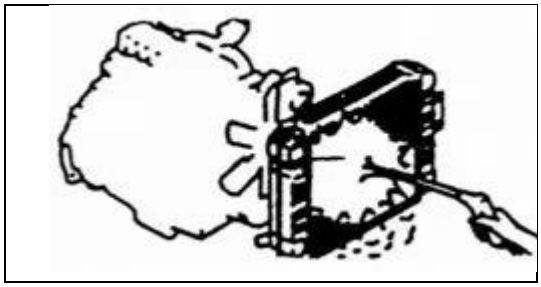
Look out

Dust flies into your eyes, so you should wear protective goggles or dust-proof glasses.

If the heat sink is blocked, it will cause overheating, so compressed air, steam, or water should be used to blow the heat sink.

Look out

When using compressed air or steam to clean the radiator, point the nozzle at a right Angle to the radiator.



5. Operation when the engine has overheated

If the engine overheats, do not stop the engine immediately, but do as follows:

① Run the engine at a low speed;

② Open engine to improve engine compartment ventilation;

③ When the water temperature drops, stop the machine;

④ Check the coolant and add water if needed.

6. DPF cleaning

The longer the DPF is run, the more ash (combustion residue) is collected in the filter. Excessive ash accumulation will adversely affect DPF performance.

If there is an alarm or every 4000 working hours, you need to contact the after-sales service and use professional equipment to clean the DPF once

For this service or agent, please contact Nori Group Co., Ltd. sales company or agent.

Ⅲ、Precautions for using liquefied petroleum gas forklift

LPG fuel system is mainly composed of cylinder, filter, pressure regulator, mixer and so on. LPG from the cylinder through the combination valve and high pressure pipeline through the filter into the pressure reducer, after vaporization into the mixer and air mixed in a certain proportion, into the engine cylinder combustion, drive forklift truck work.

1、LPG filling and replacement

After the fuel in the cylinder is used up, it must be replaced. First, close the outlet valve to disconnect the quick connector, put the dust cap on the quick connector on the cylinder outlet valve, and remove the cylinder fixed on the vehicle to the filling station. When filling LPG, it is necessary to lay the cylinder flat, put the liquid intake limit valve on the upper end (at this time, the liquid level indicator is at a 60° Angle with the horizontal line), then unscrew the dust cover on the air charging valve, insert the gas plug, and open the liquid intake limit valve for inflation. When the LPG is filled to about 80% of the cylinder volume, take out the gas plug (when it is filled to 80% of the rated capacity). Its limited device can be automatically closed). After the charging stops, pull out the charging plug, tighten the dust cover of the charging valve, and tighten the liquid inlet limit valve. After installing the cylinder at a certain Angle (the liquid level indicator is about 60° Angle with the horizontal line), connect the connection pipe with the quick connector, open the valve switch of the cylinder, and check for air leakage. If any air leakage is found, remove it before starting the forklift truck. Turn off the forklift after each use.

2、Operation of dual fuel transfer switch

1. When the switch is switched to GAS, the engine burns gasoline;
2. When switched to LPG, the engine burns liquefied petroleum gas;
3. In the middle. Neither of them are in circulation.

3、Start of dual fuel engine

1. Gasoline starting

Turn off the LPG, close the gasoline switch for a few seconds, then open the ignition key, and start the motor to start running with gasoline;

2. Start with LPG

① Starting without gasoline in the carburetor: If there is no gasoline in the carburetor before starting, you can directly start with LPG, that is, turn off the gasoline switch, open the LPG switch for a few seconds, and then open the key to start the motor, the engine can run;

② There is gasoline starting in the carburetor: at this time, it is not easy to start with LPG, only to turn off the LPG switch and the gasoline switch (select the switch to the middle position), and start with gasoline. When the gasoline in the carburetor is about to run out and the engine speed is low, turn on the LPG switch and convert to LPG. Or all the gasoline in the

carburetor is burned out, the engine stops running, and then open the LPG switch, open the key to start the motor, and the engine can run.

4、Fuel conversion in engine operation

Switch from LPG work to GAS work:

① Turn the fuel transfer switch from the LPG position to the middle position, press the accelerator pedal slightly and hold it still, allowing the engine to accelerate until the engine stops.

② After the engine has come to a complete stop, turn the fuel transfer switch to the GAS position before restarting the engine.

Switch from GAS work to LPG work:

① Turn the fuel transfer switch from the GAS position to the middle position. Press the accelerator pedal slightly and hold it still, accelerating the engine until it stops.

② When the engine is fully stopped, open the outlet stop valve on the side of the LPG cylinder, turn the fuel transfer switch to the LPG position and restart the engine.

Look out

1、Do not use the fuel switch to change the fuel while the engine is running. It is important to remember that it can only be used after the engine has come to a complete stop.

2、Drive at least a few kilometers on gasoline every two weeks to prevent it from spoiling.

3、After starting the engine, do not immediately change the fuel used, before changing the fuel, the engine should be at normal operating temperature.

When the forklift uses LPG, special attention should be paid to the following points:

Before driving, check the liquefied gas cylinders and pipelines for leaks.

When shutting down the engine after LPG operation, the following methods should be strictly followed:

① Turn the fuel transfer switch to the middle position;

② Idling the engine until it stops;

③ Be sure to use up the full amount of remaining LPG. When the engine stops, turn the key switch to the "Off" position

4、When the work is completed and before storing the vehicle without use for a long period of time, the cylinder outlet stop valve should be completely closed and the engine should be checked for air leakage.

5、If air leakage, failure or other abnormal phenomena are found during operation, the cylinder air outlet stop valve should be completely closed immediately and professional maintenance personnel should be asked to check the LPG system.

5、Matters needing attention

（1）If LPG leakage is found during the operation of forklift truck, the LPG switch should be cut off immediately, and the liquid outlet valve should be closed, and the loose leakage of the pipeline joints of each unit and fastener of the device should be checked, and treated in time. If the fault is not removed, use gasoline.

（2）Dual-fuel vehicles should use 93# gasoline or automotive LPG as fuel, otherwise it will affect the accuracy of the ignition time and reduce the power performance.

（3）When stopping for more than 10 minutes, the LPG switch (or outlet valve) should be turned off.

（4）When the engine is running, it is most appropriate to keep its water temperature at 70 ° C to 85 ° C.

6、Vacuum regulator

The pressure reduction regulator has two functions, one is the pressure reduction function, which will reduce the LPG pressure from the cylinder to one atmosphere; The second is evaporation, liquid LPG vaporizes IPG by absorbing the heat of the engine cycle.

7、mixer

The mixer is based on the operation of the engine, the vaporized LPG and air mixed into the engine, to meet the requirements of the engine under the famous working conditions.

8、cylinder

（1）Feature

It is a fuel storage and supply system of LPG forklift truck, which is composed of safety valve, LPG air filling port, air outlet quick fitting joint and corresponding accessories. The main function is:

a. Stop valve

Manual valve for controlling inlet and outlet lines.

b. Charge limiting valve

When the LPG is filled to 70%~80% of the cylinder capacity, it automatically closes.

c. Liquid level display

Can directly display the level of LPG in the cylinder.

d. Flow limiting valve

Automatically shut down when the flow is too large (system damage, flow exceeds the design value).

e. Safety valve

When the pressure in the cylinder exceeds the specified pressure, the safety valve automatically opens to relieve the pressure and play a safety protection role.

（2）Main parameter

Operating temperature:-40℃~+60℃;

Working pressure: 2.2MPa;

Opening pressure of the safety valve: 2.5MPa±0.2MPa;
Maximum filling capacity: 80% of cylinder volume.

(3) Cylinder structure

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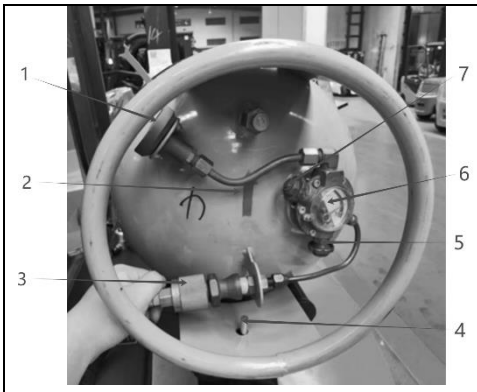
<tr><td rowspan="4"> 
</td><td>1、Charging valve(Air inlet and dust cover)</td><td>2、Installation mark</td></tr>
<tr><td>3、Air outlet valve (outlet port)</td><td>4、Fixed pin</td></tr>
<tr><td>5、Outlet stop valve</td><td>6、Liquid level indicator</td></tr>
<tr><td>7、Intake end stop valve</td><td></td></tr>
</table>

(4) Cylinder replacement

Use the safe operating procedure label on the cylinder (see Figure 1)

① When the vehicle stops on a flat, solid road, turn off the engine and tighten the hand brake;

② Remove the cylinder:

a. Turn off the outlet stop valve and send to the outlet interface. (See Figure 2)

Figure 1

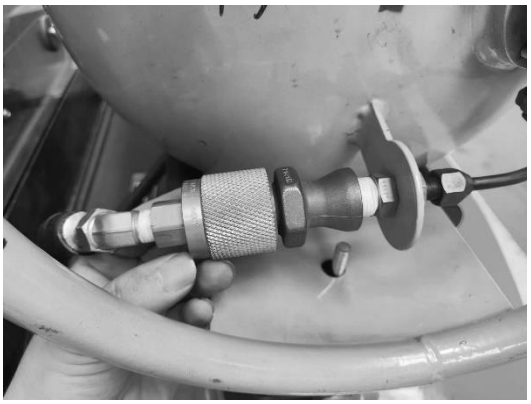
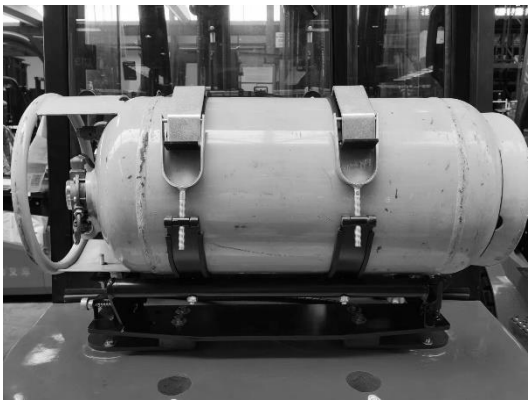


Figure 2

b. Loosen the cylinder and secure it. The detailed steps are shown in the diagram below:

Steel belt bracket

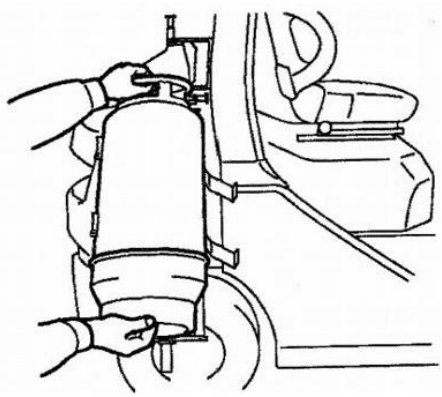
	

Buckle bracket

	
Buckle and tensioner	1. Hold the tensioner with your right hand, and pull the latch out with your index, middle, and ring fingers
	
2. Continue 1 while pushing the tensioner up and touching the cylinder	3. Continue to hold the latch out and pull down firmly on the entire tensioner

 4. The buckle loosens from the tensioner	5. Loosen the buckle of the left tensioner in the same way

Remove cylinder to fill station

	**Look out:** 1、The cylinder is heavy to prevent collision with the heavy block when lifting down; Prevent harm to the human body. 2、Make sure the outlet stop valve is closed. 3、Cylinders must be filled at a gas station with a LPG filling license issued by the Quality and Technical Supervision Bureau. Private filling is strictly prohibited, and the composition of liquefied petroleum gas must meet the "Table 1 Technical requirements for automotive liquefied petroleum gas".

Look out:

a) No. 1 product can be used at ambient temperature above -20℃

b) Product No. 2 can be used under conditions of ambient temperature above -10℃

c) Product No. 3 can be used under conditions of ambient temperature above 0℃.

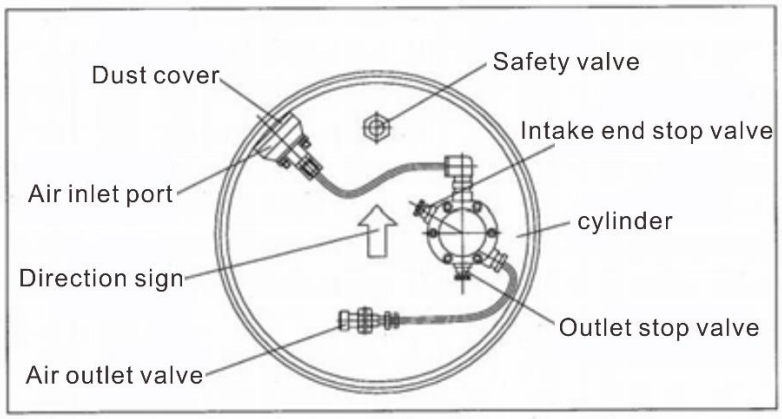


Table 1 Technical requirements for automotive LPG

item		Quality index			Test method
		Number one	Number two	Number 3	
Vapor pressure (37.8℃, gauge pressure)/kPa		≤1430	890～1430	660～1340	GB/T 6602[a]
Mass fraction of components /%	propane	＞85	＞65～85	40～65	SH/F 0614[b]
	Butane and above components	≤2.5	—	—	
	Pentane and above components	—	≤2.0	≤2.0	
	Total olefin hydrocarbon	≤10	≤10	≤10	
	Butadiene(1,3 butadiene)	≤0.5	≤0.5	≤0.5	
residue	Evaporation residue /（mL/100mL）	≤0.05	≤0.05	≤0.05	SY/T 7509
	Oil stain observation	pass	pass	pass	
density（20℃）（kg/m3）		Actual measurement	Actual measurement	Actual measurement	SH/T 0221[c]
Copper corrosion/grade		≤1	≤1	≤1	SH/T 0232
Total sulfur content（mg/m3）		≤270	≤270	≤270	SH/T 0222[d]
Hydrogen sulfide		There is no	There is no	There is no	SH/T 0125
Free water		There is no	There is no	There is no	Visual

				inspection
Note 1: The total sulfur content is the gaseous content under the condition of 0℃ and 101kPa. Note 2: The presence of free water in the sample can be determined by visual method at the same time as the density measurement.				
1、The evaporative pressure can be calculated by the GB/T 12576 method, but GB/T 6602 is used for arbitration. 2、The components can be determined by SH/T 0230 method, but SH/T 0614 is used in arbitration. 3、The density can be determined by GB/T 12576, but SH/T 0221 is used in arbitration. 4、The total sulfur content can be determined by SY/T 7508 method, but SH/T 0222 is used in arbitration.				

Select from: National standard of the People's Republic of China《Liquefied petroleum gas for vehicles》(GB 19159-2003)

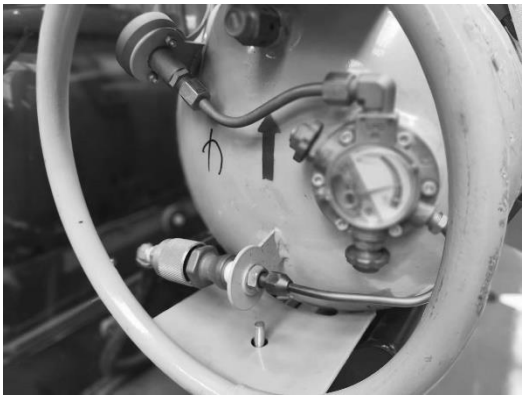
9、LPG cylinder change procedure

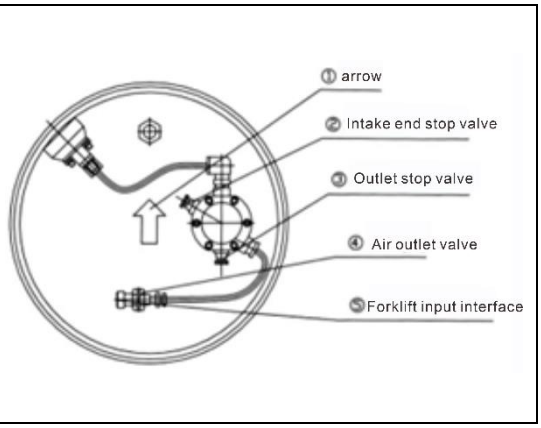
（1）Wear canvas gloves when breathing to prevent frostbite from leaking gas gasification.

（2）Ventilation should be carried out in an open place with air circulation, smoking is prohibited, and other open flames are avoided.

（3）When filling LPG, it is necessary to lay the cylinder flat, put the intake stop valve on the upper end, then unscrew the dust cover on the intake stop valve, insert the inflation plug, open the intake stop valve for inflation, and take out the inflation plug when the LPG is filled to about 80% of the cylinder volume (when the inflation is 80% of the rated capacity, the limited device can be automatically closed). After the charging stops, pull out the charging plug, tighten the dust cover of the charging valve, and tighten the intake stop valve. Check that all parts are in good condition.

（4）Lift the cylinder onto the car and secure the cylinder with the arrow (①) facing upwards. Fixed pin inserted into cylinder.





（5）Ensure inlet and outlet stop valves (②③) they're all shut down.

（6）Connect the input interface (⑤) of the forklift truck with the outlet valve (④) and tighten it.

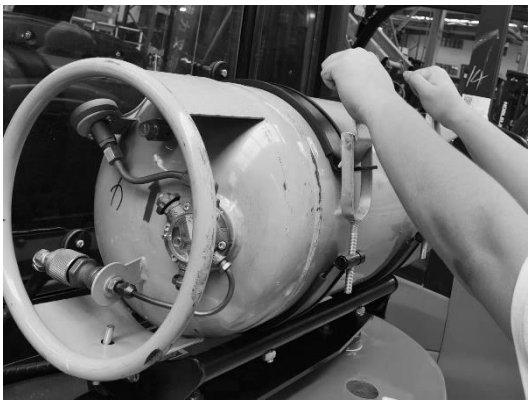
（7）Slowly open the outlet stop valve (③).

（8）Check that there is no leakage before use. If there is leakage, immediately close the air outlet stop valve (③), and unscrew the input interface of the forklift truck (⑤).

Look out：After installing the cylinder, connect the connection pipe with the quick connector, open the stop valve at the outlet end of the cylinder, and apply soap bubbles to each pipe joint to check for air leakage. If air leakage is found, remove it before starting the forklift truck. Close the outlet stop valve ③ after each use of the forklift truck.

10、Method of securing cylinders

Steel belt bracket



The steel belt fixing method is the opposite of the disassembly step

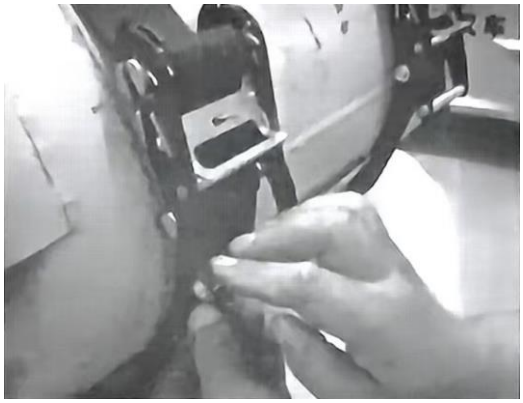
Buckle bracket

① Hold the tensioner in the right hand, the buckle in the left hand, and align the direction with the slot of the ratchet shaft

② The buckle goes through the slot of the ratchet shaft

③ Pull the buckle down with your

④ Keep the buckle basically taut,

left hand, and pull the buckle out with your right index, middle, and ring fingers, pushing it up to touch the cylinder.	keep the buckle pulled out, and continue to turn the tensioner downward with your right hand. Until you hit the cylinder.
	
⑤ Continue to tighten with the left hand, hold the tensioner with the right hand, release the lock and turn the tensioner up and down several times until it cannot be pushed.	⑥ Pull down to the impact cylinder.

11、Precautions for use

（1）When the assembly is filled with LPG, first open the inlet end stop valve, close the outlet end stop valve, and close the inlet end stop valve after the filling is completed;

（2）When the assembly is on the car, it should be firmly installed, the cylinder face direction arrow is up, and the inlet and outlet gas stop valve are closed. Connect the input end interface of the forklift truck with the outlet end interface of the assembly, tighten it, open the stop valve of the outlet end, check that there is no leakage, and it is convenient to use;

(3) Every time after filling LPG and when using the car, the leak must be detected in time.

（4）Pay attention to dust prevention at the inlet inlet. After filling LPG, turn on the dust control device in time to protect the sealing of the check valve of the inlet;

（5）The opening pressure of the safety valve has been set. It is strictly prohibited to change it without authorization;

（6）Abnormal circumstances must be overhauled by qualified units, and shall not be adjusted without authorization. At the same time, the abnormal cylinder is stored in isolation;

(7) The assembly can be filled with LPG in two ways: volume method and weight method. Filling by weight method, the cylinder should be placed upright; Fill by volumetric method, the cylinder should be horizontal, and the direction sign is upward;

(8) The filling, transportation, storage, use and inspection of cylinders shall strictly comply with the Regulations on the Safety Supervision of Cylinders issued by the State Bureau of Quality and Technical Supervision;

(9) Cylinders must be lightly loaded and unloaded, and are not allowed to collide with each other and be hit by other external forces. The cylinder assembly parts should be kept in good condition and should not be disassembled, adjusted or replaced by themselves;

(10) The cylinder can be repeatedly filled with LPG of GB1174 standard, and the maximum filling amount is not more than 80% of the water volume of the cylinder;

(11) Cylinders must be filled at a gas station with a LPG filling license issued by the Quality and Technical Supervision Bureau. No private filling;

(12) When new and reinspected cylinders are put into service for the first time, the filling unit must vacuum or replace the cylinders with nitrogen;

(13) Before reloading the cylinder, the cylinder should be positioned according to the vertical installation mark on the cylinder body, lay down smoothly, close the outlet gas stop valve, and open the intake gas stop valve. When filling, pay attention to whether the pointer of the level gauge rises synchronously with the liquid filling. After the charge limit valve is operated, stop filling liquid immediately and check whether the liquid level indicator pointer is in the normal position. After filling the liquid, the intake stop valve must be closed;

(14) Before the cylinder is used, it should be checked for leaks and other abnormal phenomena, and it should not be used with faults;

(15) If LPG leakage is found in the work of forklift truck, the LPG switch should be cut off immediately, and the air outlet stop valve should be closed, and the leakage of the pipeline joints of each unit and fastener of the device should be checked, and treated in time;

(16) If the stop time exceeds 10 minutes, the outlet stop valve should be closed;

(17) The cylinder should be protected from exposure to the sun, not near the heat source and open flame, and it is strictly prohibited to heat the cylinder with a heat source exceeding 40 ° C;

(18) The gas in the cylinder shall not be exhausted, and no less than 0.5% of the specified filling amount of remaining gas shall be left;

(19) It is strictly prohibited to change the steel seal and color mark of the cylinder without authorization;

(20) Cylinders must be regularly inspected every 5 years by a testing unit approved by the pressure vessel safety supervision body according to the specified test date;

(21) The forklift should observe the change of cylinder gas volume at any time during the work. If the gas consumption is found to be inconsistent with the working time, the truck should stop to check whether there is gas leakage. Once the gas leakage is found, the power supply and the valves should be turned off immediately and measures should be taken in time.

(22) When the forklift truck is parked, it should be parked in a cool and ventilated place as far as possible, close the cylinder valve, and do not expose the cylinder to the sun.

(23) When the forklift is in the warehouse, the power supply and all valves should be turned off, and the garage should have good ventilation conditions and fire extinguishing measures.

(24) It is strictly prohibited to repair liquefied petroleum gas cylinders, valves or pipelines in garages and parking lots, and it is strictly prohibited for drivers to smoke in the vehicle.

12、Care and maintenance

（1）This forklift truck has passed the pressure test and quality inspection before leaving the factory. If there is any quality problem in use, it is strictly prohibited to repair it personally.

（2）The cylinder outlet stop valve should be closed before the LPG unit is disassembled and serviced.

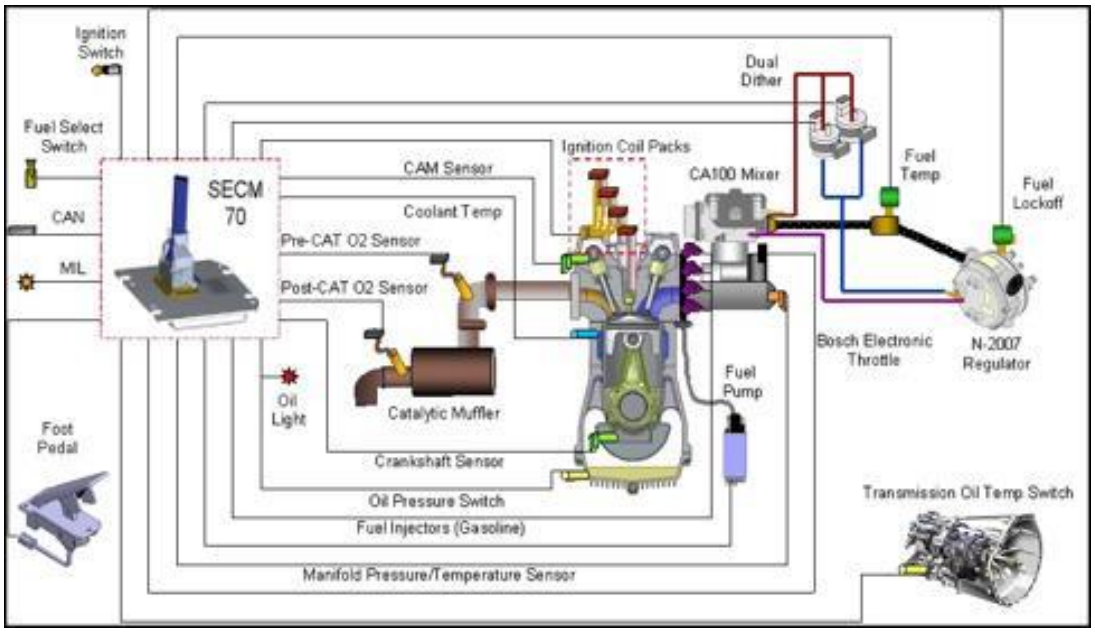
（3）With the change of the season, the air consumption of the forklift will change, and the mixer can be adjusted appropriately.

（4）Always check and clean the air filter and LPG filter, and replace it in time if it is damaged. Always keep the air filter clean.

（5）After the assembly and commissioning of the LPG forklift truck is completed, the decompression regulator must be adjusted after 1 working day (or using a bottle of gas) to ensure a proper air-fuel ratio.

（6）Check the connectors of the electrical switching system for oxidation and corrosion every three months, and remove them in time.

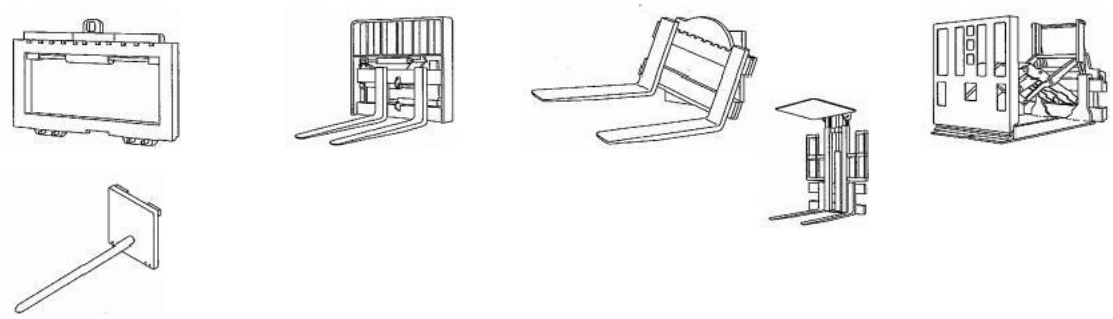
（7）Perform routine maintenance on the entire LPG fuel system every year, including cleaning of the pressure reducer and checking the tightness of the high-pressure and low-pressure gas path joints.



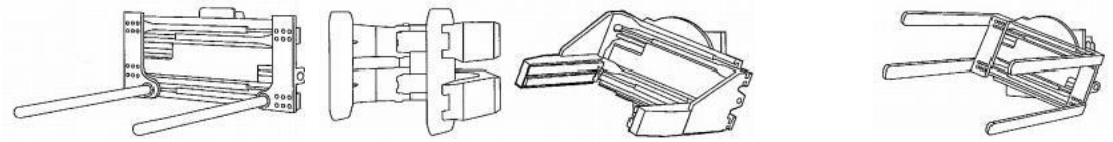
LPG fuel diagram

IV、Rules for the use, installation and safety of equipment

Nori forklifts in accordance with international standards ISO2328《Mounting dimensions of forklift hook type fork and fork holder》It is required to match dozens of accessories, such as flat clip, rotary clip, paper roll clip, string rod, side shifter and so on.



Side shifter pitchfork rotator push-puller String rod



Pole clamp Roll clip Brick clamp Load stabilizer Swivel fork

1、Use of accessories

（1）Be familiar with the relevant contents on the nameplate of forklift equipment, read the relevant operation instructions carefully before use (especially the user manual and installation instructions of professional equipment companies), and the operation of forklift equipment should be trained and qualified.

（2）The basic performance and operation methods of forklift accessories should be fully understood, especially the allowable load, lifting height, cargo size and the adaptive range of accessories;

（3）When operating a forklift with multiple functions, such as side shift clamping or rotation, it is prohibited to perform two actions at the same time, and only one action can be performed after the other is completed;

（4）Equipped with forklift is strictly prohibited to drive in the state of high cargo position; When the cargo volume is too large, do not drive the

forklift truck forward; When transporting goods, ensure that the bottom of the goods is 300mm off the ground and the door frame tilts backward

The above translation results are from Youdao Neural Network Translation (YNMT) · General Scene;

(5) The weight of the goods must not exceed the limit of the combined carrying capacity of the forklift truck and accessories. In the high cargo position, try not to offset the load, and the equipment with the side shift function can only be operated in a short time, and the offset load is strictly controlled within the range of about 100m (the side shift of more than 5 tons < including 5 tons > is 150mm);

(6) Under the projection area of the equipment and goods directly below the outer 2 meters, except for the driver's position protected by the top frame, it is strictly prohibited to stand to prevent accidents;

(7) It is strictly forbidden to brake the forklift truck with equipment in the process of traveling, and it is required to drive slowly when carrying a load;

(8) Prohibit the equipment from being impacted by external forces while working; It is prohibited to use the equipment for improper occasions and shall not exceed the normal working range of the equipment;

(9) It is prohibited to use the equipment for improper occasions and shall not exceed the normal working range of the equipment;

(10) If there is a problem with the equipment, it is prohibited to continue using it without exclusion.

Perform the following checks and maintenance regularly

(1) Check the clearance between the lower cross beam of the forklift fork and the lower hook of the appliance, in accordance with the appliance manual.

(2) Check that the hook is properly embedded in the groove of the fork rack of the forklift.

(3) Lubricate the sliding support surfaces with automotive general

purpose lithium grease every 500 hours.

（4）Whether fasteners are loose.

（5）Check regularly whether the joints of the hydraulic circuit are loose and whether the hose is damaged. If there is damage, do not use it before repair.

（6）Check regularly whether the transmission or rotation components of the equipment are damaged or stuck, and replace them in time if they are damaged or defective.

（7）In the case of dynamic load, check whether the working element is normal, whether the working pressure of the attachment is normal, whether the attachment is working normally, if it is not normal, it is necessary to check the hydraulic circuit, find out the leaking element, and replace the seal or the entire circuit element.

2、Installation of fittings

warn

1、Without the technical permission of the company, any modification of forklift equipment related to safety and performance is strictly prohibited.

2、The actual rated carrying capacity should be the lowest of the rated carrying capacity of the forklift truck, its own carrying capacity and the overall carrying capacity of the vehicle. In general, the overall carrying capacity of the vehicle is the smallest of the three. The "bearing capacity of an object" is only a calculated value of the force on the object itself.

3、The installation position is reasonable, reliable and safe to avoid sliding the accessories along the fork frame of the forklift during use.

4、After the attachment is mounted, the hook block should be embedded in the gap of the upper beam, so that the offset between the center line of the attachment and the center line of the fork is less than 50mm, otherwise it will affect the lateral stability of the forklift.

5、After mounting the accessories with rotating function (paper roll clip, soft clip, multi-purpose rigid arm clip, bucket clip), solder stop blocks on both sides of the joint between the cross beam of the cargo fork and the accessories to prevent the occurrence of left and right side slip during the operation of the accessories.

6、When installing fittings with lower hook positioning, the clearance between the lower hook and the lower cross beam of the fork frame should be properly adjusted.

V、OPS (Operator Presence Awareness) system description

OPS system (electric reversing hydraulic vehicle only)

The Operator Presence Sensing (OPS) system is mainly used for safety protection. That is, when the operator is not in the correct driving position, the forklift cannot be moved. This reduces misoperation accidents.

Forklift flameout state

The driver leaves the seat or the seat belt is released (such as the seat belt protection switch), the hand brake is not pulled on, and the buzzer sounds an alarm.

No seat belt protection switch: the driver sits back in the seat correctly or pulls the overhand brake, and the buzzer alarm is lifted.

Seat belt protection switch: the driver first sits back in the seat correctly and then buckle the seat belt or pull the overhand brake, and the buzzer alarm is lifted.

Forklift starting condition

1. activate

The driver should sit in the seat correctly, buckle the seat belt (such as equipped with the seat belt protection switch), or pull the hand brake, while the shift switch to the middle position, in order to start normally. Not in neutral, cannot start.

warn

If the forklift is parked on the slope, the brake pedal must be pressed to start it to avoid the danger of the forklift slipping.

2. Forward and backward protection

After the engine starts, when it is ready to start, the gear switch is hung to forward 1 gear or backward 1 gear, and it can start normally. If the gear switch is directly hung to the second gear forward or the second gear backward, the middle indicator blinks and cannot start, and the gear switch needs to be returned to the middle to remove the protection.

If the forklift truck is driving, the driver leaves the seat or the safety belt is released (such as equipped with a safety belt protection switch) for more than 3 seconds, the buzzer sounds an alarm, the median light flashes, the OPS light lights, and the automatic stop.

The driver sits on the seat correctly again, the buzzer alarm is lifted, the OPS indicator light is extinguished, the gear switch is hung back to neutral, the indicator light blinks and turns on, and then hangs to forward or backward gear, and the forklift truck resumes driving.

Look out

Some models: Instrument without "OPS indicator.

For forklift trucks with seat belt protection switch, the driver must sit back in the seat correctly before buckling up the seat belt to operate normally.

warn

If the OPS system is accidentally started when driving uphill, the drive power will be interrupted and the forklift will fall off. In order to avoid this kind of accident, it is necessary to properly sit in the seat when going uphill.

3. Working device protection

If the driver leaves the seat or the safety belt is released (such as the safety belt protection switch) for more than 3 seconds during the handling operation, the buzzer will emit an alarm sound, the OPS indicator will be lit, and the handling operation will automatically stop. Resettle into the seat correctly and the handling operation continues.

Look out

For forklift trucks with seat belt protection, the driver must first sit back in the seat correctly and then buckle the seat belt to operate normally.

Return the tilting handle and accessory handle to the initial position before removing the protection.

OPS Controller Exception

If the following situations occur, stop the forklift in a safe place and contact the Nori dealership for inspection.

1. When you are ready to start, the gear switch is switched to forward 1 or back 1, and the median indicator flashes.

2. Pull the overhand brake and the buzzer continues to sound the alarm.

3. The gear switch is hung back to the middle position, and the middle indicator is still blinking.

4. When the driver leaves the seat or the seat belt is released (such as the seat belt protection switch) for more than 3 seconds, the buzzer does not emit an alarm sound, and the OPS indicator light cannot be lit.

5. The driver re-sits in the seat correctly, the buzzer continues to sound the alarm, and the OPS indicator light cannot be extinguished.

 **Look out**

Some models: instrument without "!" OPS indicator light

Ⅵ、Dynamic system

1．Forklift power configuration

			CPC(D)20/25-AX1，CPC(D)30/35/38-N1X1
Engine	Engine builder		4D29V41（National IV）
	Engine rating ISO1585	kw	36.8
	Rated speed	rpm	2500
	Number of cylinders / displacement	cm3	4/2850
	Maximum torque	N.m/rpm	165/1600-1800
	Rated voltage	V	12
	Starting battery capacity	V/Ah	12/80

Engine / parameter	Diesel engine
	SPD-S4S-G3-3
Rated power kW	35.3
Rated speed r/min	2250
Maximum torque N·m/ Rotational speed r/min	177/1700
weight kg	/

Engine / parameter	Diesel engine	
	4D29V41-001	4D29V41-050
Rated power kW	34	36.8
Rated speed r/min	2500	2500
Maximum torque N·m/ Rotational speed r/min	140/1600～1800	165/1600～1800
weight kg	≤260kg	≤260kg
Emission class	National IV	

Engine parameter	Diesel engine
	4D29X41-300
Rated power kW	36.8
Rated speed r/min	2500
Maximum torque N·m/ Rotational speed r/min	175/1600 ~ 1800
Emission class	National IV

Engine parameter	Diesel engine	
	4D32X41-001	4D32X41-020
Rated power kW	36.8	
Rated speed r/min	2500	
Maximum torque N·m/ Rotational speed r/min	200/1400 ~ 1600	200/1600 ~ 1800
Emission class	National IV	

Engine parameter	Diesel engine	
	4D29X41-011	4D29X41-003
Rated power kW	34	36.8
Rated speed r/min	2500	2500
Maximum torque N·m/ Rotational speed r/min	140/1600 ~ 1800	175/1600 ~ 1800
weight kg	≤260kg	≤260kg
Emission class	National IV	

Engine parameter	Diesel engine
	4D32V41-001
Rated power kW	36.8
Rated speed r/min	2500
Maximum torque N·m/ Rotational	186/1600 ~ 1800
Emission class	National IV

The detailed technical parameters, structure and maintenance of the engine can be found in the engine operation and maintenance manual. After engine maintenance, its exhaust emission value

should be tested and meet the requirements of the following table:

GB20891-2014 Emission limits for diesel engine exhaust pollutants for non-road mobile machinery (China Phase III)

Engine power (Pmax) (kW)	CO (g/kW•h)	HC (g/kW•h)	NOX (g/kW•h)	HC+ NOX (g/kW•h)	PM(granule) (g/kW•h)
37≤Pmax <75	5.0	—	—	4.7	0.40
Pmax <37	5.5	—	—	7.5	0.60

GB20891-2014 Emission limits for diesel engine exhaust pollutants for non-road mobile machinery (China Phase Ⅳ)

Engine power (Pmax) (kW)	CO (g/kW•h)	HC (g/kW•h)	NOX (g/kW•h)	HC+ NOX (g/kW•h)	PM(granule) (g/kW•h)
56≤Pmax <75	5.0	0.19	3.3	—	0.025
37≤Pmax <56	5.0	—	—	4.7	0.025
Pmax <37	5.5	—	—	7.5	0.60

2．Domestic diesel engine

2.1　4D32G31，4D27G31　Main technical parameters（China Phase III）

Engine / parameter		4D32G31	4D27G31
type		In-line, water-cooled, four-stroke, direct injection platform	
cylinder：Number of cylinders Cylinder diameter x stroke		4，98mm×105mm	4，90mm×105mm
Total displacement		3.168	2.67 L
Compression ratio		18.5	18.4
Rated power / Rated speed		36.8kW/2500 r/min	36.8kW/2500 r/min
Maximum torque / Speed of rotation		186N·m/(1600 -1800) r/min	156N·m/(1700 -1900) r/min
Minimum no-load speed		750 r/min	
Minimum fuel consumption at full load		≤225g /kW·h	≤235 g /kW·h
Specific oil consumption		≤1.0 g /kW·h	≤1.2 g /kW·h
Rotation direction (facing the flywheel)		Counterclockwise direction	
Cylinder sequence		1-3-4-2	
Cooling mode		Closed, forced water cooling	
Lubrication mode		Pressure, splash lubrication	
noise		≤111 dB（A）	
Overall dimension： Length × width × height		787mm×726mm×719mm	746mm×569mm×694 mm
Reference data	Oil capacity	about 6.5L　API　CF Grade or above	
	Valve clearance	Cold state：intake valve 0.35mm ，exhaust valve 0.45mm	
	Valve timing（Measured by crankshaft Angle）	See engine manual	

2.2 4N23G31 Main technical parameters（China Phase III）

Engine / parameter		4N23G31
type		In-line, water-cooled, four-stroke, direct injection
cylinder： Number of cylinders Cylinder diameter x stroke		4， 85mm×100mm
Total displacement		2.27
Compression ratio		18.0
Rated power / Rated speed		30kW/2500 r/min
Maximum torque / Speed of rotation		131N·m/(1700 -1900) r/min
Minimum no-load speed		750 r/min
Minimum fuel consumption at full load		≤230 g /kW·h
Specific oil consumption		≤1.2 g /kW·h
Rotation direction (facing the flywheel)		Counterclockwise direction
Cylinder sequence		1-3-4-2
Cooling mode		Closed, forced water cooling
Lubrication mode		Pressure, splash lubrication
noise		≤111 dB（A）
Overall dimension： Length × width × height		695mm×551mm×635mm
Reference data	Oil capacity	about 6.5L， API CF Grade or above
	Valve clearance	Cold state： intake valve 0.28mm， exhaust valve 0.33mm
	Valve timing （Measured by crankshaft Angle）	See engine manual

2.3. 4D27XG30，4D27XG40/505　　Main technical parameters（China Phase III）

Engine / parameter		4D27XG30	4D27XG40/505
type		In-line, water-cooled, four-stroke Direct injection (DI)	
cylinder：Number of cylinders Cylinder diameter x stroke		4, 90mm×105mm	
Total displacement		2.67 L	
Compression ratio		17.9	
Rated power / Rated speed		36.8kW/2500 r/min	36.8kW/2500 r/min
Maximum torque / Speed of rotation		165N·m/(1500 -1800) r/min	165N·m/(1600 -1800) r/min
Minimum no-load speed		750±15 r/min	
Minimum fuel consumption at full load		≤225g /kW·h	
Specific oil consumption		≤1.0 g /kW·h	
Rotation direction (facing the flywheel)		Counterclockwise direction	
Cylinder sequence		1-3-4-2	
Cooling mode		Closed, forced water cooling	
Lubrication mode		Pressure, splash lubrication	
noise		≤108 dB（A）	
Net engine weight		≤260kg	
Emission class		National III（GB20891-2014）	National IV（DB11/185-2013）
Emission control uses technology		High pressure common rail	
Reference data	Oil capacity	about 6.5L　API CF Grade or above	
	Valve clearance	Cold state：intake valve 0.35mm ，exhaust valve 0.45mm	
	Valve timing (Measured by crankshaft Angle)	See engine manual	

2.4 4D29X41 Main technical parameters（China Phase IV ）

Engine parameter	4D29X41-011	4D29X41-003
manufacturer	Zhejiang Xinchai Co., LTD	
Total displacement	2.85	
Compression ratio	17.9	
Number of cylinders × diameter × stroke	4×93×105	
Technical route	High pressure common rail + self-priming	
Rated power	34kW(2500r/min)	36.8kW(2500r/min)
Maximum output torque	140N·m/(1600 -1800) r/min	175N·m/(1600 -1800) r/min
Idle performance	700±10 r/min	
Maximum idling speed	2700±20 r/min	
Emission class	National IV	
noise	≤108dB(A)	
weight	≤260kg	
Rotation direction (facing the flywheel)	Counterclockwise direction	

2.5 4D32X41 Main technical parameters（China Phase IV ）

Engine / parameter	4D32X41
type	In-line, water-cooled, four-stroke direct injection
cylinder： Number of cylinders Cylinder diameter x stroke	4, 98mm×105mm
Total displacement	3.17L
Compression ratio	17.5
Rated power / Rated speed	36.8kW/2200 r/min
Maximum torque / Speed of rotation	210N·m/(1400 -1600) r/min
Minimum no-load speed	800±50 r/min
Minimum fuel consumption at full load	≤238g /kW·h
Rotation direction (facing the flywheel)	Counterclockwise direction
Cylinder sequence	1-3-4-2
Cooling mode	Closed, forced water cooling
Lubrication mode	Pressure, splash lubrication
Net engine weight	270kg
Emission class	National IV（GB20891-2014）
Emission control uses	High pressure common rail
Oil pan capacity	8L Grade CH-4 or above

2.6 4D29V41 Main technical parameters （China Phase IV ）

Engine / parameter	4D29V41-001	4D29V41-050
manufacturer	Zhejiang Xinchai Co., LTD	
Total displacement	2.85	
Compression ratio	17.9	
Number of cylinders × diameter × stroke	4×93×105	
Technical route	VP pump + self-priming	
Rated power	34kW(2500r/min)	36.8kW(2500r/min)
Maximum output torque	140N·m/(1600 -1800) r/min	165N·m/(1600 -1800) r/min
Idle performance	730±30 r/min	
Maximum idling speed	2700±20 r/min	
Emission class	National IV	
noise	≤108dB(A)	
weight	≤260kg	
Rotation direction (facing the flywheel)	Counterclockwise direction	

2.7 4D32V41 Main technical parameters （China Phase IV ）

Engine	4D32V41-01
manufacturer	Zhejiang Xinchai Co., LTD
Total displacement	3.17
Number of cylinders × diameter × stroke	4×98×105
Technical route	VP pump + self-priming
Rated power	36.8kW(2500r/min)
Maximum output torque	186N·m/(1600 -1800) r/min
Idle performance	730±30 r/min
Maximum idling speed	2700±20 r/min
Emission class	National IV
noise	≤108dB(A)
weight	≤260kg
Rotation direction (facing the flywheel)	Counterclockwise direction

3．C240 PKJ-30 Diesel engine

3.1 Main technical parameters

Engine / parameter			C240 PKJ（Isuzu (China) Engine Co., LTD）
type			Four-stroke, water-cooled, in-line, overhead valve, vortex chamber type
cylinder： Number of cylinders Cylinder diameter x stroke			4 - 86mm×102mm
Total displacement			2.369L
Compression ratio			20
Rated power / Rated speed			35kW/2500r/min
Maximum torque / Speed of rotation			139N·m/1800r/min
Minimum no-load speed			700rpm
Minimum fuel consumption at full load			0.39g /W·h
Rotation direction			From the fan end, the direction is clockwise
Cylinder sequence			1-3-4-2
Cooling mode			forced water cooling
Lubrication mode			Forced lubrication
Main component	Oil nozzle		throttling
	The air filter		Paper filtration
	Oil pump		Cycloidal pump
	Water pump		Vortex type
	thermostat		Wax pill type
	generator	Voltage/curr	12V/35A
		Power generation mode	Ac power generation, silicon rectification
	Starter machine	Voltage	12V
		Output power	2kW
Reference data	Oil capacity		6.1L API CD Grade or above
	Valve clearance		0.45mm
	Initial injection pressure		120kg/cm2
	Fuel injection timing		BTDC9°

The detailed technical parameters, structure and maintenance of the engine can be found in the engine operation and maintenance manual.

3.2 C240 Diesel engine maintenance

3.2.1 Retighten the cylinder head bolts

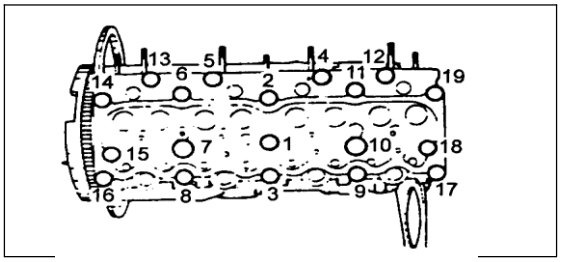
When the engine is cooling, it is divided into two steps according to the sequence shown

Retighten the cylinder head bolts.·torque：

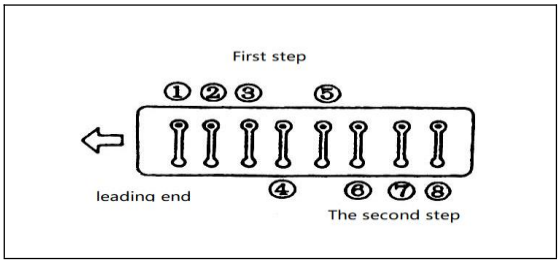
79N·m ~ 97N·m

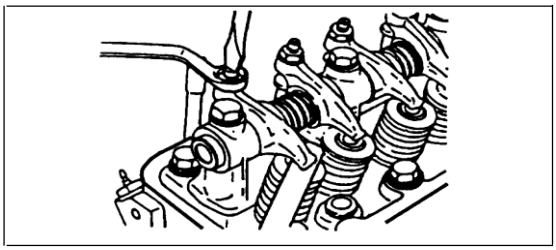
·In two steps： First step： 55N·m ~ 68N·m

The second step： 79N·m ~ 97N·m



3.2.2 Adjust the inlet and exhaust valve clearance





Start and fully preheat the engine, then turn off the engine; Remove valve rocker arm cover; Turn the crankshaft.

Set the No. 1 cylinder to the top dead center of the compression stroke, and then adjust the valve clearance: ① ② ③ ⑤

Set cylinder No. 4 to top dead center of compression stroke and adjust valve clearance: ④ ⑥ ⑦ ⑧

Valve clearance (heat engine) Inlet and exhaust valve clearance (heat engine) 0.45mm

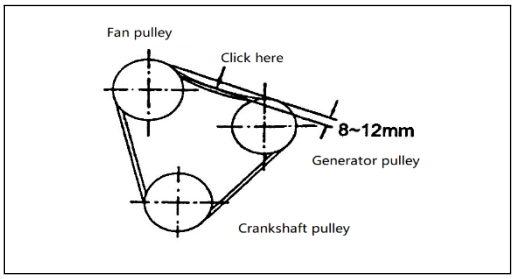
3.2.3 Checking and adjusting fan belt tension

1） Appearance check for cracks, abrasions, wear and lubricity. The belt should not touch the bottom groove of the pulley.

2） Press the belt in the middle of the pulley with the big female finger， Check belt sag.

Belt sag： 8 ~ 12 mm

thrust： 98 N



3.2.4 Change the oil and oil filter

1) Start the engine, warm it up, and then turn it off.

2)Remove the oil filler cap and oil pan drain plug and release the oi。

⚠ Warning ： Be careful not to burn yourself, the engine oil can be very hot。

Emulsion oil indicates that the oil is mixed with coolant, and the cause should be corrected.

Very thin oil indicates that the oil contains diesel oil.

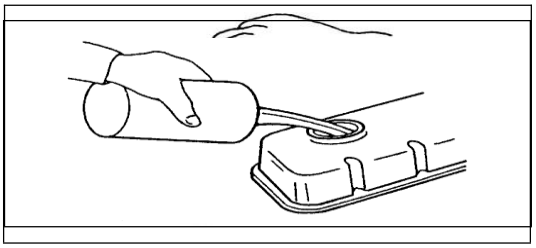
3) Wipe and install drain plug and gasket.

Tightening torque of oil drain plug: 29N·m ~ 39N·m

4) Remove the oil filter with a tool.

5) Wipe the oil filter mounting surface with a clean cloth.

6) Apply a small amount of oil to the rubber ring of the new oil filter.



7) Install the new oil filter, can only be twisted by hand, can not be tightened with a wrench properly installed.

10) Fully preheat the engine, then turn off the engine, wait for a while to check the oil level. If necessary, add. When checking the oil level of the machine, park the forklift on a level surface. Oil capacity: 6.1L

8) Refer to the "Operation and Maintenance Manual" forklift oil list, fill the recommended oil. Pull out the oil gauge to check the oil level.

9) Start the engine and check the area around the drain plug and oil filter for oil leaks. If there is significant leakage, the part is not

3.2.5 Replace engine coolant

To avoid the risk of being burned, do not change the coolant while the heat engine is running.

When using antifreeze, follow the directions on the antifreeze container to mix antifreeze with water.

3.2.6 Cleaning the heat sink

Use dry compressed air to clean the outside of the radiator of mud, dust, dirt.

3.2.7 Checking the cooling system, hoses and connections Check the inlet and outlet water pipes and installations for looseness or aging, and tighten or replace them if necessary.

3.2.8 Clean or replace the air filter

The filter element must be cleaned or replaced according to the recommended cycle, and should be maintained regularly in harsh environments.

3.2.9 Drain water from fuel

When the oil-water separator alarms, water should be drained:

1) Loosen the drain plug at the bottom of the fuel filter;

2) Clean the oil and water in the cylinder;

3) Ensure that the drain plug is tightened to prevent oil leakage.

3.2.10 Exhaust gas in the fuel line

· Air entering the fuel system will cause starting difficulties and engine failure.

· Exhaust should be carried out whenever the tank or fuel filter is drained or the filter element is replaced.

Air removal method:

1) Loosen the two exhaust screws on the fuel injection pump housing;

2) Loosen the manual pump cover;

3) Press the manual pump up and down until there are no more bubbles discharged from the exhaust screw;

4) Tighten the exhaust screw and the manual pump cover

3.2.11 Replacing the Fuel Filter

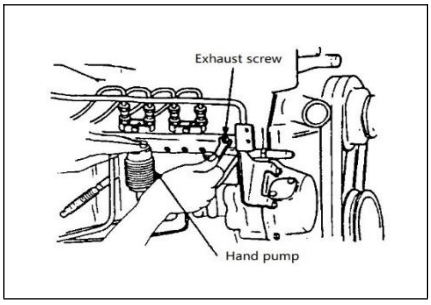
1) Loosen the fuel filter counterclockwise by hand or wrench. Discard the filter element.

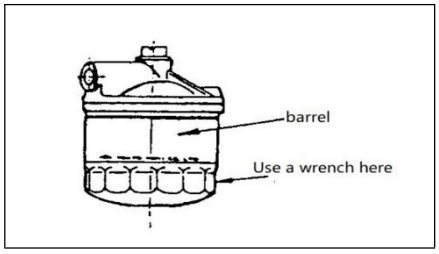
2) Wipe the installation surface with a cloth, which is conducive to the correct fitting of the new fuel filter.

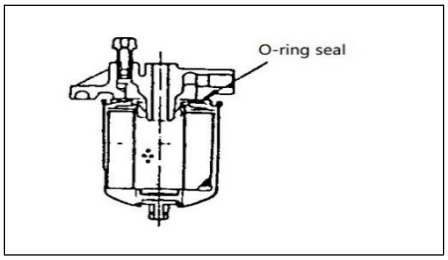
3) Apply a thin layer of oil to the O-ring.

4) Fuel is added to the fuel filter, which helps to remove air.

5) Screw in the fuel filter until the O-ring seat enters the sealing surface. Use the wrench to screw in another 2/3 turn.







Ⅶ、Clutch

1.Date

forklift / argument		2.0t ~ 3.8t Mechanical forklift truck
type		Monolithic dry type
Friction plate size mm	Outside diameter	275
	Inside diameter	175
	Thickness when pressed	7.8
Surface area cm2		352
Weight kg		About 10
Operation formula		Treadboard type

2． Detection and adjustment

	2.0t ~ 3.8t Clutch
Separation rod height（mm）	64.5±0.50
Separation rod height difference（mm）	Less than 0.4
Clearance between disengaging rod or diaphragm spring and disengaging bearing（mm）	2-2.5（Disengaging lever）
Friction plate wear limit (to rivet head)（mm）	Greater than 0.3

3 . Fault diagnosis and correction

3.1 1.0t ~ X4t Mechanical clutch(except CPC machinery car)

condition	Possible cause	measure
Clutch slip · The fault is difficult to determine, but the following abnormal phenomena can be used as the basis for determining the fault: 1) The speed cannot be increased; 2) After pressing the accelerator pedal, the engine speed cannot be increased; 3) Power loss, especially when climbing; 4) Increased fuel consumption. These anomalies are often misinterpreted as engine failures If the clutch slip is not detected, it will cause the clutch friction lining, clutch cover and flywheel to wear or stick. Inspection method 1) Fully pull the overhand brake; 2) Press the clutch pedal and switch to the highest gear; 3) Step down the accelerator pedal and slowly release the clutch pedal. · If the engine stalls, it proves that the clutch is working well. · If the engine does not stall, it proves that the clutch is slipping.	· Oil or dirt on the friction lining of the clutch. · Excessive wear of clutch friction lining. · Weak or damaged spring. · No separation bearing clearance is set. · Flywheel and clutch pressure plate are distorted.	Remove or replace change change adjust change
Poor clutch disengagement · When shifting gears, especially when shifting into reverse gear, there are obvious "Click" sound and difficulty in shifting. Inspection method 1) Press the clutch pedal and shift to low gear; 2) Then switch to neutral again and press the accelerator pedal. 3) Pause for a moment and then change the reverse gear. · If the "click" sound is loud when shifting into reverse gear, it is clear that the clutch cannot be properly disengaged.	· The clutch friction is lined with oil. · Pedal travel is not enough. · Clutch friction plate tilting twist. · The separation bearing clearance is too large. · Weak spring pressure.	Remove or replace adjust change adjust change
Clutch jitter	· The spring varies in length and tightness. · The separation bearing is not working. · The adjusting screws of the separation rod are not in the same plane. · Heavy loading. Clutch one-sided, not fully engaged. · The separation bearing or sleeve is broken.	Adjust or replace Add grease after cleaning adjust Loading as prescribed Disassembly adjustment change
noise Unusual noise or banging	· Clutch friction liner rivet loose. · Clutch disc assembly breaks.	Change change

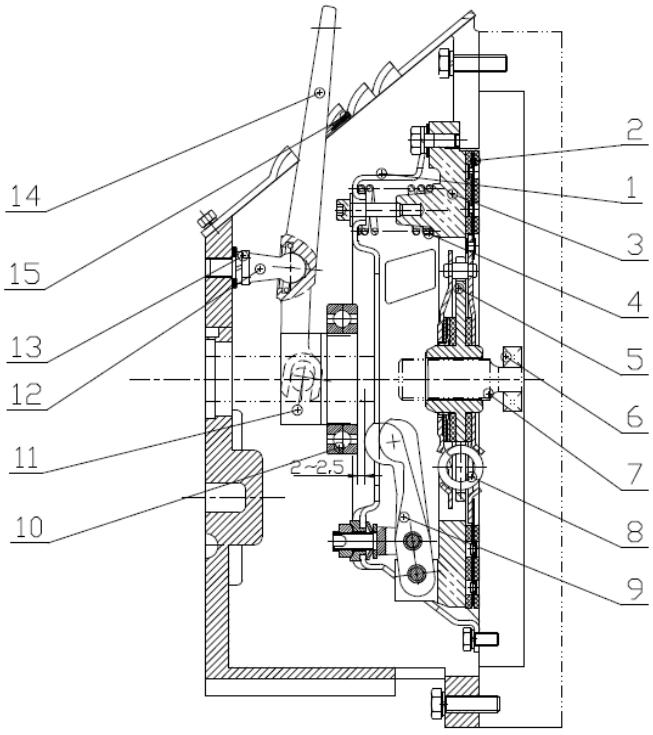
3.2 Mechanical clutch （CPC machinery car）

condition	Possible cause	measure
Clutch slip	· Oil or dirt on the friction sheet. · The clutch pedal has no free travel	Wipe with gasoline and sandpaper. adjust
Clutch jitter	· Overload · The friction plate is cracked or	Reduce the load. Replace the friction plate assembly.
Pedal weakness	· Air leakage or lack of oil. · Oil leakage from main pump.	Check the sealing condition of each joint, add enough brake fluid to replace the main pump leather ring.

4． clutch（Icon 2-1）

4.1 Mechanical clutch (except CPC machinery car)

The mechanical forklift is equipped with a single dry clutch and a hydraulic transmission mechanism. The clutch friction plate 2 is made of a driven disc and two asbestos plastic friction plates riveted. A wave spring plate is arranged between the driven plate and the friction plate, and the pressure on the clutch pressure plate is generated by 6 springs distributed on the circle of the pressure plate. The clutch housing of 3.8 tons and X4t is thickened, and the structure of the press plate and cover assembly and the driven plate assembly are different.



Icon 2-1 clutch

1. Pressure disc shell 2. Clutch friction plate 3. Pressure disc 4. Pressure spring 5. Disc hub
6. Bearing 7. Drive shaft 8. Damper disc spring 9. Separation rod 10. Separation bearing
11. Detangle bearing sleeve 12. Support bolt 13. Nut 14. Detangle fork 15. cover

4.1.1 Check and adjust

1) The clearance between the top of the clutch release rod 9 and the end face of the clutch release bearing should be 2mm when the clutch is engaged

-2.5mm. This clearance is used to prevent damage to the clutch release bearing and friction disc from burning out. Because the forklift is often in acceleration and reversing conditions, the clutch is used frequently, and the friction plate is worn quickly, and the adjustment of this gap should be paid attention to frequently.

2) Check the height difference of the three clutch separation rods, whether it is less than 0.4mm, otherwise it should be adjusted. Tighten the lock nut after adjustment.

4.1.2 Replace the friction plate assembly

1) Step on the clutch pedal, and use three spacer sleeves respectively between the pressure disc shell and the separation rod to remove the friction plate;

2) Rotate the sliding screw at the upper end of the transmission counterclockwise (see Figure 3-1) to make the drive shaft retract into the gearbox;

3) Remove the 6 bolts of the pressure disc shell, make them free from the flywheel, and then take out the old friction plate assembly;

4) Install the new friction plate assembly. Pay attention to make the disc hub 5 spline sleeve of the friction plate extend the longer end towards the transmission side;

5) Turn the sliding screw clockwise, gradually pull out the drive shaft, and insert it into the spline hole of the friction disc hub;

6) When it is judged that the drive shaft has indeed entered the middle bearing of the flywheel, lock the sliding screw and tighten the torque 107N·m ~ 119N·m;

7) Install the pressure disc shell on the flywheel;

8) Step on the clutch pedal and remove the three spacer sleeves;

9) Adjust clutch pedal travel.

4.2 Mechanical clutch （CPC machinery car）（Icon 2-2 ）

The CPC machinery car mechanical car is equipped with a diaphragm spring clutch (push-type). The pressure disc and cover assembly are fixed on the pressure disc cover by a diaphragm spring through a rivet, and the outer perimeter of the pressure disc. The diaphragm spring is both a pressure element and a separation element. Its advantages are as follows:

1) Due to the good nonlinear characteristics of the diaphragm spring, the pressure of the diaphragm spring remains almost constant from the time the new parts are loaded until the friction plate is worn, and the transmission of engine torque is stable.

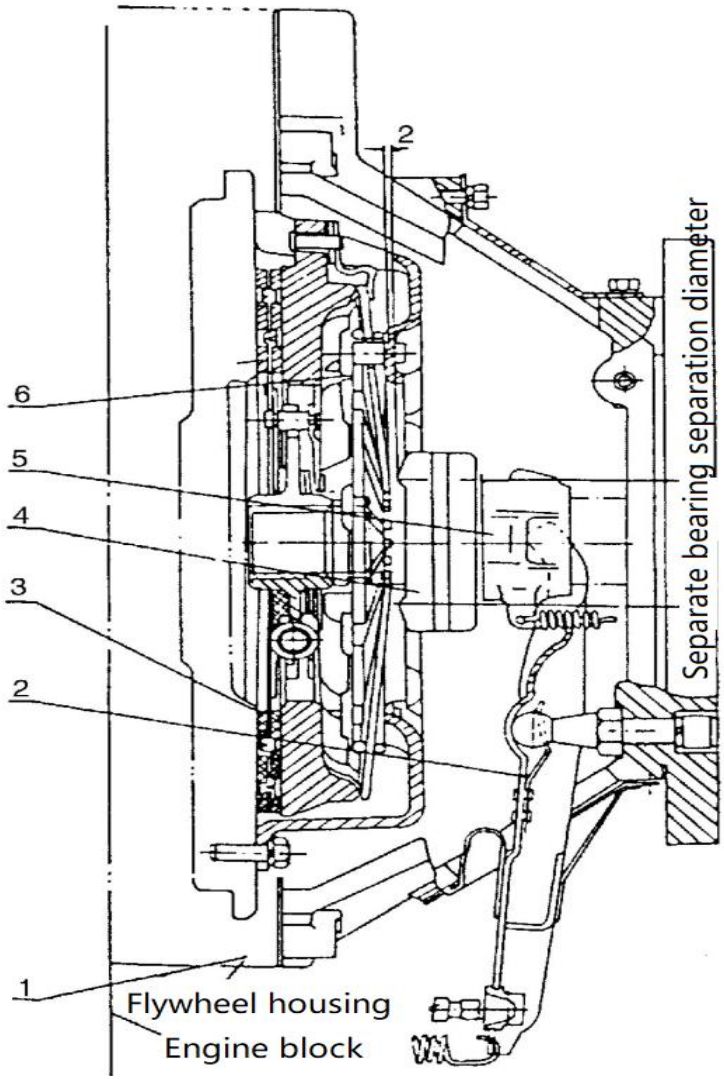
2) The driven disc assembly is equipped with a torsion shock absorber. It can well absorb and reduce idle vibration and vibration at normal speed, so that the transmission system avoids resonance.

3) The use of medium pressure disc assembly and driven disc assembly need not be adjusted, the diaphragm spring can not be removed, the use of the process does not need to be removed, no adjustment, so the use and maintenance are very convenient.

4.2.1 Check and Adjustment

1) When the clutch is engaged, the free travel of the clutch pedal is 35mm ~ 40mm. Brake master pump piston and push rod clearance 0.5mm ~ 1mm.

2) Replace the friction plate assembly, see 4.1.2.


2
6
5
4
3
2
1
Separate bearing separation diameter
Flywheel housing
Engine block

Icon 2-2

Ⅷ、Mechanical transmission, reducer and differential

1．argument

		JDS30 (2.0/2.5/3.0/3.5/3.8t)
shift	Shift type	Manual shift, sliding synchronizer
	Number of files	Two gears forward, two gears back
	Advance 1 /2 gears Reverse 1 /2 gears	3.252/1.407 3.204/1.386
retarder	Reduction gear	Spiral bevel gear
	Reduction ratio	2.1
differential	Reduction gear	Spur gear
	Reduction ratio	6.182
	Differential gear	Straight bevel gear
Lubricating oil	Model, brand	GL-5 85W/90 Gear oil
	Oil litre	8
Weight kg		100
Remark		

Note: · Lubricating oil is added from the drive axle housing vent, because the axle housing communicates with the housing.

· Use pure lubricating oil specified by Nori.

2．Fault diagnosis and correction

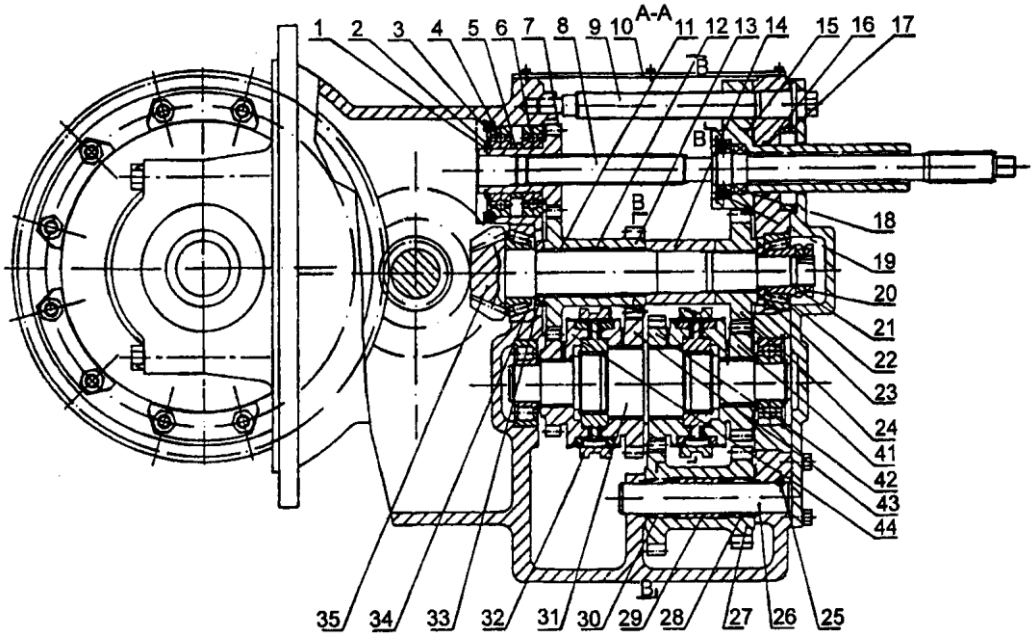
Current	Possible cause	Correction square method
Large vibration	· Fastening bolts at each mounting connection are loose	· Tightening
Excessive oil temperature	· Gear oil deterioration · Abnormal oil level · Moving parts stuck	Replace add or subtract adjustments
Oil leakage	· The bonding surface bolt is loose · The seal ring is broken	Tighten and replace
Noise	· Rotation gear is damaged · Bearing damage	· Change · Change

3. summarize

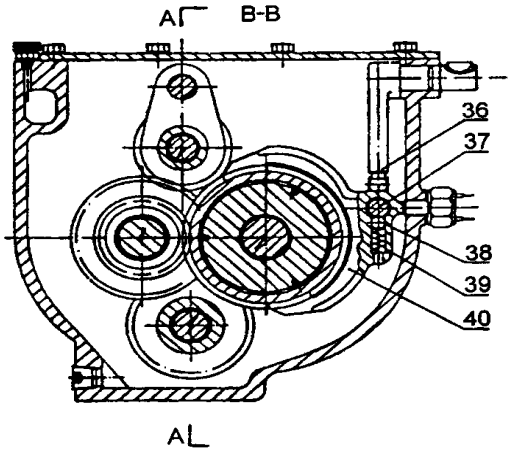
The mechanical transmission of 2.0t-3.8t mechanical forklift truck is composed of three parts: shift transmission, reducer and differential, and has the function of shift transmission, deceleration and differential transmission. It is equipped with a synchronizer to avoid gear impact when shifting, especially when reversing, which can make the shift soft and smooth, reduce shift noise and improve gear life. 3.0t-3.8t (normal) using the JDS30 model. The structure and principle of JDS30 are introduced below. The structure and principle of JDS18, JDS30, JDS30H and JDS37 are the same, but the difference is that the number of teeth of some gears is different or the tooth thickness is increased, and the strength of some components is strengthened.

4．The gearshift part

The JDS30 gear shift part is mainly composed of the following parts: an input shaft, an output shaft, a spindle, and an idler shaft (for reverse gear). Each shaft has one or several different number of gears, the main shaft is equipped with two sets of meshing sleeve synchronizer, the use of shift handle to shift operation, the output shaft through the low speed gear and differential and half shaft to transmit the engine power to the driving wheel. Icon 3-1。



1. Elastic ring 2. Spacer 3. Elastic washer4. Ball bearing5. Spacer 6. Ball bearing7. Input gear
8. Input shaft 9. Sliding screw10. Box cover11. Needle roller bearing 12. Bushing
13. Double gear14. Bushing15. Bearing bracket16. O-ring17. Shaft ring18. Oil seal 19. Ball bearing
20. Bearing nut21. Bearing nut22. Tapered roller bearing23. Thrust plate24. Output gear
25. Steel ball26. Idler shaft27. Idler28. Needle roller bearing29. Bushing30. Needle roller bearing
31. Spindle32. Meshing sleeve33. Thrust washer 34. Tapered roller bearing 35. Output shaft
36. Rotating lever 37. Shift lever 38. Steel ball 39. Spring 40. Shifting fork
41. Forward gear 42. Reverse gear 43. Low speed gear 44. High speed gear



Icon 3-1JDS30 Mechanical transmission structure diagram (shift part)

4.1 Input shaft and slide screw

The input shaft is inserted into the flywheel inner ball bearing at one end of the clutch, and the other end is splined with the input gear (which is usually engaged with the double gear mounted on the output shaft) and fixed to the transmission shell ball bearing. The middle part is installed on the bearing frame through the ball bearing and the elastic retaining ring, and the bearing frame is installed on the transmission shell by means of the sliding screw. If the clutch friction plate assembly needs to be replaced, Together, the input shaft and the bearing frame can move along the axis by turning the T-thread of the sliding screw, so that the input shaft is retreated into the gearbox housing.

4.2 Output Shaft

Double gear through two needle roller bearings and spacer set on the output shaft, the other end of the output shaft through the spacer spline is equipped with output gear wheel, output shaft is equipped with circular cone roller bearings at both ends, the rear end of the gasket to adjust the bearing backlash, double gear medium gear meshing with input gear and high-speed gear, small gear meshing with low speed gear, The output gear is often engaged with the forward gear and the reverse idler.

4.3 Main Axis

High speed gears, low speed gears, reverse gears and forward gears are mounted on the main shaft by needle roller bearings, and because they are constantly engaged with the double gear, the reverse idler and the input gear respectively, they can be shifted or reversed by operating the synchromesh on the main shaft.

The shifting part of the mechanical transmission other than the JDS30 is only different from the gear part of the output shaft, and the rest of the structure is the same.

4.4 idler shaft

The idler shaft is fixed on the gearbox housing, the rear end is positioned with a steel ball, and the idler is mounted on the idler shaft with a needle roller bearing. The idler is engaged with the reverse gear and the output gear respectively.

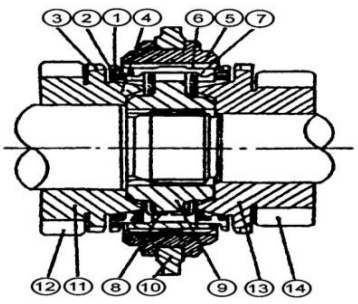
4.5 Rotating rod and shift fork

Two rotating rods 36 are used to change the high and low speed gears and the front and reverse gears respectively. The fork 40 is supported on the shift rod 37.

Lock the ball 38 in the shift lever slot with spring 39 to secure the shift position.

4.6 synchronizer

The sliding synchronizer is mainly composed of synchronous cone, synchronous ring, insert block and meshing sleeve. The synchronizer can be used to realize the shift operation between slow and fast gear, forward and backward gear. See Figure 3-2



Icon 3-2 synchromesh

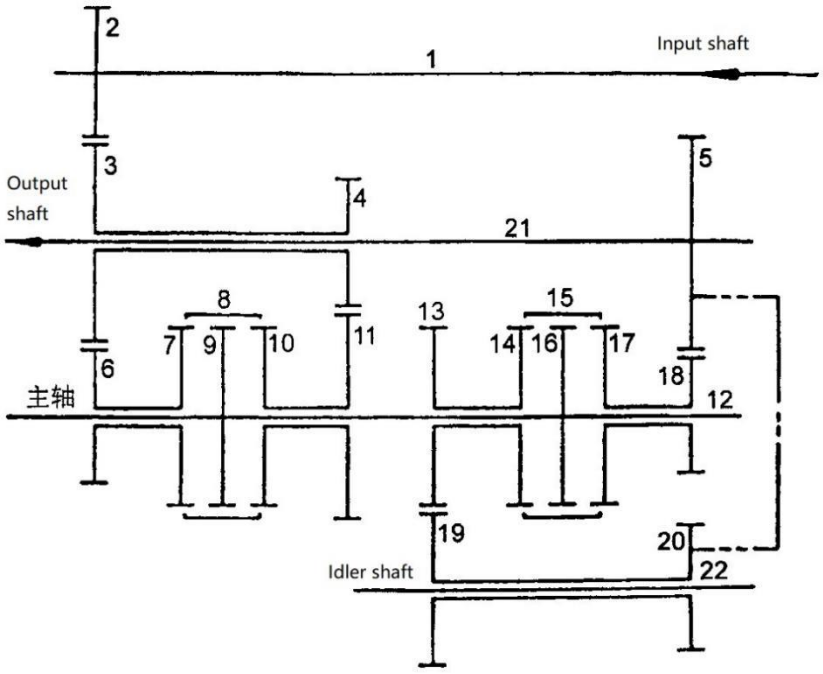
1. Synchronous ring spline 8. Spring
2. Synchronous ring 9. Clutch driven disc hub
3. Spline teeth of gear 11. 10. Fork
4. Synchronous insert 11. Often engaged gear
5. Gear sleeve 12. Gear 11 teeth
6. Spline of meshing sleeve 5. 13. Gear with constant meshing
7. Insert block 14. Gear 13 teeth

a. Synchronization cone: Gear 11 or 13 has an axial cone (synchronization cone) and involute spline through which the friction surface and spline teeth are combined with the synchronization ring (part 2) and the engagement sleeve (part 5), respectively.

b. Synchronous ring: the synchronous ring has a hole cone, through which the friction surface is matched with the synchronous cone, the synchronous ring has three grooves evenly distributed along the circumference of the garden, and the three grooves are aligned with the position of the meshing sleeve spline and the synchronous ring spline, so as to press the synchronous ring through the meshing sleeve spline 6.

c. Insert block: the middle protruding part of the three insert blocks is inserted into the spline groove of the meshing sleeve 5, and the two ends are embedded in the corresponding three grooves of the synchronization ring, and the insert block is pressed to the top of the spline groove 6 by two springs 8, and the outward spring force facilitates the spline teeth of the synchronization ring to be often in the center position.

4.7 Power transmission（Icon 3-3）



Icon 3-3 Mechanical transmission schematic

1. Drive shaft 2. Input gear 3. Double gear4. Double gear 5. Output gear 6. High-speed gear 7.Synchronous cone 8. Meshing sleeve9. Clutch driven disc hub10. Synchronous cone11. Low speed gear12. Spindle13. Reverse gear 14. Synchronous cone 15. Engagement sleeve16. Clutch driven hub17. Synchronization cone 18. Forward gear 19. Reverse gear 20. Reverse gear21. Output shaft 22. Idler shaft

Neutral position (median)

The power from the input shaft 1 is transmitted to the high speed gear 6 and the low speed gear 11 through the meshing input gear 2, double gear 3 and 4, but because the shift gear sleeve that controls the speed and direction is in the neutral position, the output gear and output shaft of the main shaft will not rotate, so the power cannot be output.

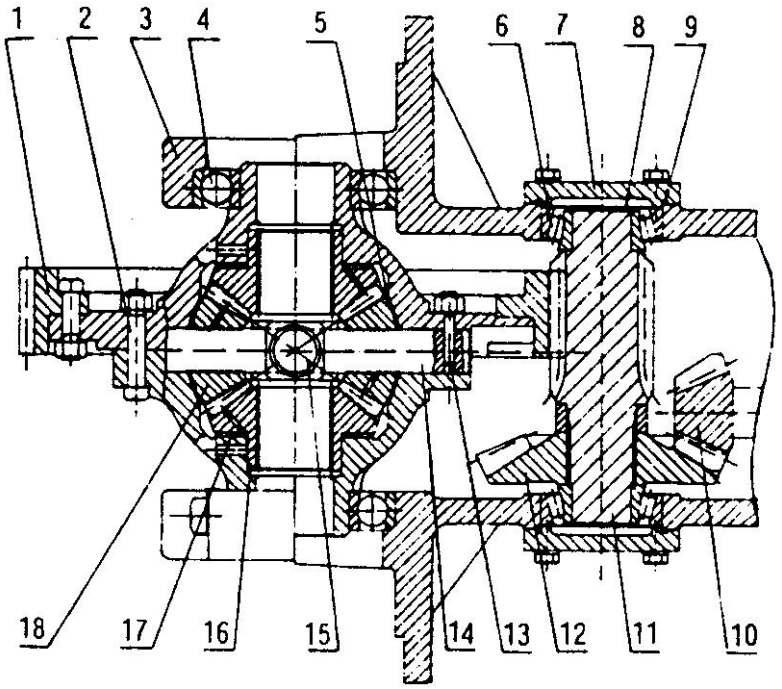
Shift position - When the shift lever is pulled, the fork drives the gear sleeve to move and engages the gears through the synchronizer. The dynamic force transfer procedure is as follows: input shaft → input gear → double gear → high speed or low speed gear → synchronizer → Main shaft → synchronizer → reverse gear or forward gear → output gear → output shaft

Forward first gear power transmission program:

1→2→3→4→11→10→8→9→12→16→15→17→18→5→21 Forward second gear power transmission program: 1→2→3→6→7→8→9→12→16→15→17→18→5→21 Backward first gear power transmission program:

1→2→3→4→11→10→8→9→12→16→15→14→13→19→20→5→21 back leg power transfer procedures: 1→2→3→6→7→8→9→12→16→15→14→13→19→20→5→21

5．Retarder（Icon 3-4）



Icon 3-4 Retarder, differential

1. Gear ring 2. Bolt 3. Bearing seat 4. Ball bearing 5. Thrust washer

6. Circular cone roller bearing7. Bearing cover 8. Gasket 9. "O" ring 10. Output shaft 11. Pinion 12. Spiral bevel gear13. Cylindrical pin 14. Gear shaft I 15. Gear shaft II 16. Shaft gear 17. Gasket 18. Planetary gear

The reducer part is located in the front of the transmission, which reduces the speed of the transmission output shaft and increases the torque from the output shaft, and then passes this torque to the differential; The reducer is mainly composed of a small helical bevel gear on the output shaft, a large helical bevel gear and a small tooth shaft. The large helical bevel gear is splined on the small tooth shaft, and both ends of the small tooth shaft are supported by conical roller bearings, and there are gaskets to adjust the side backlash.

6．differential（Icon 3-4）

Differential through the ball bearings at both ends of the bearing seat mounted on the front half shell, the front end is connected with the bridge housing, the differential shell is split left and right, with two half shaft gears and four planetary gears, the thrust washer is installed between the differential housing and the gear and the gap between the gears, the planetary gear with gear shaft I, II support, The gear shaft I is fixed to the differential housing with a cylindrical pin, and the tooth ring 1 is fixed to the differential housing with a hinged bolt.

The power from the gearbox is decelerated and the differential is generated by the differential drive through the half-shaft gears and the half-shaft to the wheels.

7．Change of fork（Icon 3-1）

①.First remove the bolts of the mounting shaft arm at the back end of the side shift rod 37;

②.Pull out the shaft arm slightly;

③.Remove the mounting bolts and cover;

④.Perform a quick shift, from forward to backward, or from backward to forward, so that the front end of the shift lever is removed from the gearbox housing;

⑤.Take out the shaft arm;

⑥.Remove the elastic retaining ring at the outer end of the rotating rod 36 with calipers;

⑦.Gently tap the rotating rod head and remove the rotating rod.。

Note: Do not hit too hard, do not hit again.

⑧.Remove fork 40 with shift lever 36. Remove the fork from the shift lever.

Attention:
· At this time, the shift position of the fork should be identified.
· Keep the spring 39 and steel ball 38 in the fork hole.

8．Reinstall the fork

Attention:
· It should be reloaded in a clean place to prevent dust and impurities from entering the box.
· Check the wear of each part, and replace it with a new one if there is excessive wear.
· In general, the seals and "O" rings should be replaced with new ones.

①.Put the spring and steel ball into the fork hole, insert it into the shift lever, gently tap it, and install it.

Attention:
· The position of the fork should be the position when it is removed.
· The steel ball on the fork should fall in the corresponding slot of the shift lever.

②.The fork and the meshing sleeve slot, while the installed fork and shift rod into the box.

③.Install the shaft arm. At this time, pay attention to the position of the shift lever.

④.Before tightening the locking screw at the end of the shaft arm, tighten the two mounting studs with a torque of 28.4N·m ~ 44N·m.

⑤.After the front shift rod head is inserted into the box, tighten the locking bolt with a torque of 7.8N·m ~ 17.6N·m, and tighten and tighten the nut with a torque of 13.7N·m ~ 23.5N ·m.

⑥.Put the rotating rod and O-ring into the housing together, and lock it with the elastic stop ring.

⑦.Install the cover gasket and cover on the shell, and tighten the bolts symmetrically, evenly and successively with a torque of 20.6N·m ~ 34.3N·m.

9．Total removal of the gearbox

Gearbox disassembly can be carried out as follows.

9.1 Removing the Differential (see Figure 3-4)

①.Remove the differential bearing seat fastening bolt.

②.Remove the differential section from the gearbox.

③.Loosen and remove bolt 2 and cylinder pin 13 to separate the left and right differential housing.

④.Remove the thrust washer 5, gear shaft 14, planetary gear 18, half shaft gear 16, gasket 17, gear shaft 15, etc.

Note: Remember that the adjusting gaskets should be placed separately and not confused.

9.2 Removing the Reducer (see Figure 3-4)

①.Loosen and remove mounting bolts at both ends of bearing cap 7.

②.Gently tap the front of pinion 11 against one end of the helical bevel gear.

③.Remove bearing 6, pinion 11, spiral bevel gear 12.

Note: Remember the position of the adjustment pad 8, the two ends of the adjustment pad should be placed separately, can not be confused.

9.3 Removing the shift part (see Figure 3-1)

9.3.1 Unscrew the sliding screw 9 and remove the O-ring 16.

9.3.2 Remove the hole on the housing with the caliper retaining ring 3, and remove the input gear 7 part from the housing.

9.3.3 Remove the retaining ring from the hole on bearing frame 15 with calipers, gently tap the right end of the input shaft to separate it from bearing frame 15, take out the input shaft 8, and remove the bearing frame from the housing.

9.3.4 Removing the Forks

Fork removal procedure see 6.

9.3.5 Removing the output shaft

①.Loosen nuts 20, 21 and gently tap the right end of output shaft 35.

②.Remove the output shaft and all parts on it.

9.3.6 Disassembly of the main shaft

①.Use a caliper to remove the retaining ring for the right end shaft of spindle 31.

②.Remove the bearing retainer using the two threaded holes on the bearing retainer 41.

③.Take out the spindle parts and remove all the parts from the spindle. The shaft retaining ring on the spindle can be removed by calipers. Note: Remember to adjust the washer position.

9.3.7 Idler parts

①.Gently tap the left end of the idler shaft.

②.Remove the idler shaft from the housing and remove all parts from it

9.4 Assembly

The assembly procedure is roughly the opposite of the disassembly procedure, but note that:

①.The mounting mating surface and gear tooth shape surface are protected against knock damage.

②.Bearings, gears, seals and parts with relative motion working surfaces should be poured with a little clean gear oil during assembly to prevent instantaneous dry friction during initial operation.

③.The parts should be assembled in place.

④.Each moving part should operate flexibly and should not be stuck.

⑤.All bolt connectors should be tightened firmly and reliably

IX、Hydraulic transmission, torque converter

1．Date

Type		YQX30 2.0/2.5/3.0/3.5/3.8t		
Torque converter	type	Single stage, two phase, three working wheels		
	Model	YJH265		
	Maximum torque coefficient K0	3		
	Circular diameter D (mm)	265		
	Maximum efficiency ηmax	0.79		
Gear ratio	Forward gear	17.4972		
	Reverse gear	17.4972	17.4972	17.4972
Hydraulic clutch	Friction plate outer diameter x inner diameter x thickness	125mm×81mm×2.7mm		
	Friction plate area	71cm2		
	Set pressure	1.1MPa ~ 1.4MPa		
retarder	Reduction gear	Spiral bevel gear		
	Reduction ratio	2.1		
differential	Reduction gear	Spur gear		
	Differential gear	Straight bevel gear		
	Reduction ratio	6.182		
weight（kg）		185		
Oil capacity（L）		7		
Using oil type		No. 6 hydraulic transmission oil		
Dimensions (L × W × H)mm× mm× mm		830×470×450		

2. summarize

2.1 YQX18, YQX30, YQX37 hydraulic transmission gearbox

The YQX18, YQX30, YQX37 hydraulic transmission is composed of a torque converter and a power shift with a front and rear gear (see Figure 4-1). Has the following advantages:

1) The hydraulic torque converter makes the hydraulic transmission have the automatic adaptability of the hydraulic transmission output, and can change its output torque and speed with the change of external load;

2) Can absorb and eliminate the impact vibration from the engine and external load on the transmission system;

3) The micro-valve can enable the forklift truck to perform micro-operation at low speed or high speed, so that the operation is simple and convenient, the start is smooth, and the labor intensity of the operator is greatly reduced.

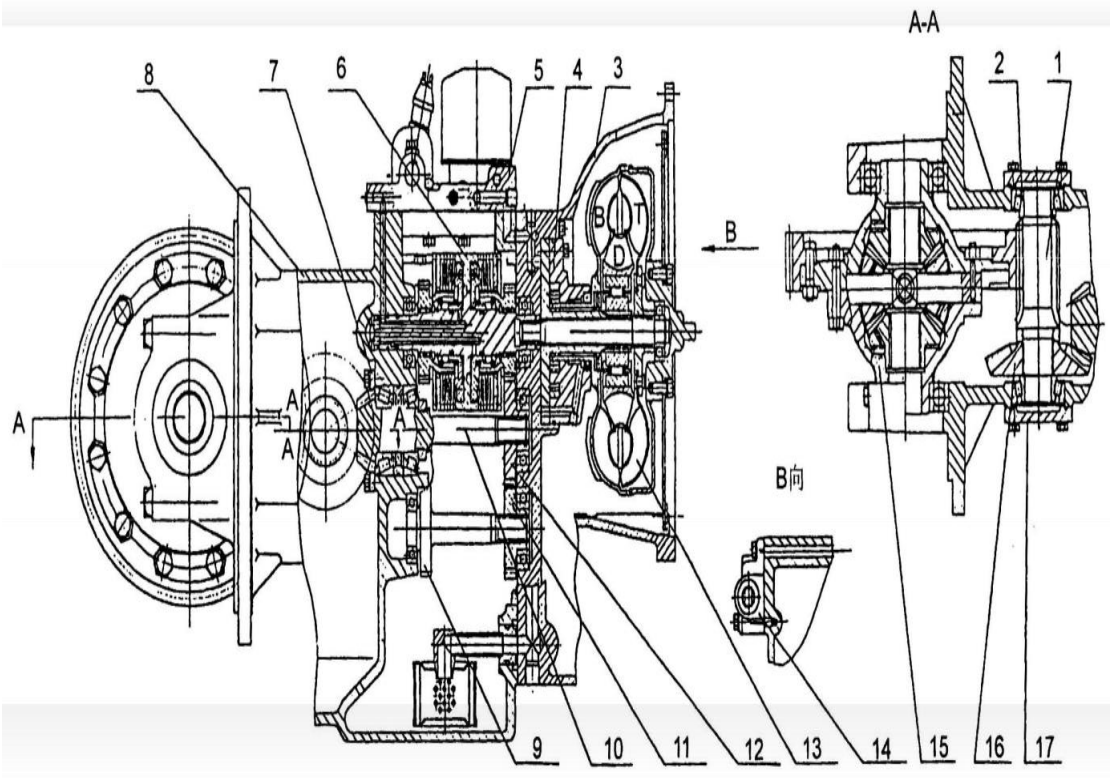


Figure 4-1 Hydraulic transmission gearbox

1. Gear shaft 2. Tapered roller bearing 3. Torque converter housing assembly
4. Oil supply pump assembly 5. Cover and control valve assembly 6. Clutch assembly
7. Support plate 8. Housing 9. Idler shaft 10. Output shaft 11. Idler wheel
12. Output gear 13. Torque converter 14. Micro valve assembly 15. Differential assembly
16. Spiral bevel gear

Compared with YQX30, different points: the hydraulic box increases the wall thickness, the clutch assembly increases the number of friction plate septs, the output gear increases the tooth thickness, the supply oil pump assembly increases the displacement, and so on.

3. Working principle

3.1 Power transmission of hydraulic transmission gearbox

The transmission diagram of the hydraulic transmission gearbox is shown in Figure 4-2. The hydraulic torque converter is driven by the engine through the elastic coupling plate 1, and drives the pump wheel 4 to rotate, so that the liquid flow flows into the turbine 2 along the direction of its blade at a high speed to drive the turbine rotation. The guide wheel 3 makes the torque converter produce a torque converter, and transmits the torque to the input assembly 11 of the hydraulic transmission through the vortex shaft 5. When the forward gear is hung, the backward clutch is idling, and the transmission sequence is 11→ 7→ 20→ 19→ 17→ 12→ 13 to drive the differential 15 output. When it is put into the reverse gear, the forward clutch is idle, and the transmission sequence is 11→ 10→ 18→ 21→ 20→ 19→ 17→ 12→ 13 to drive the differential 15 output. The forward and backward clutches are controlled by the shift control valve. Oil pump 6 is an internal gear pump, driven directly by the engine through the pump wheel. The oil pump provides pressure oil to the system, and the oil after the torque converter works enters the radiator on the vehicle

After that, enter the transmission to lubricate the friction plates, bearings and gears.

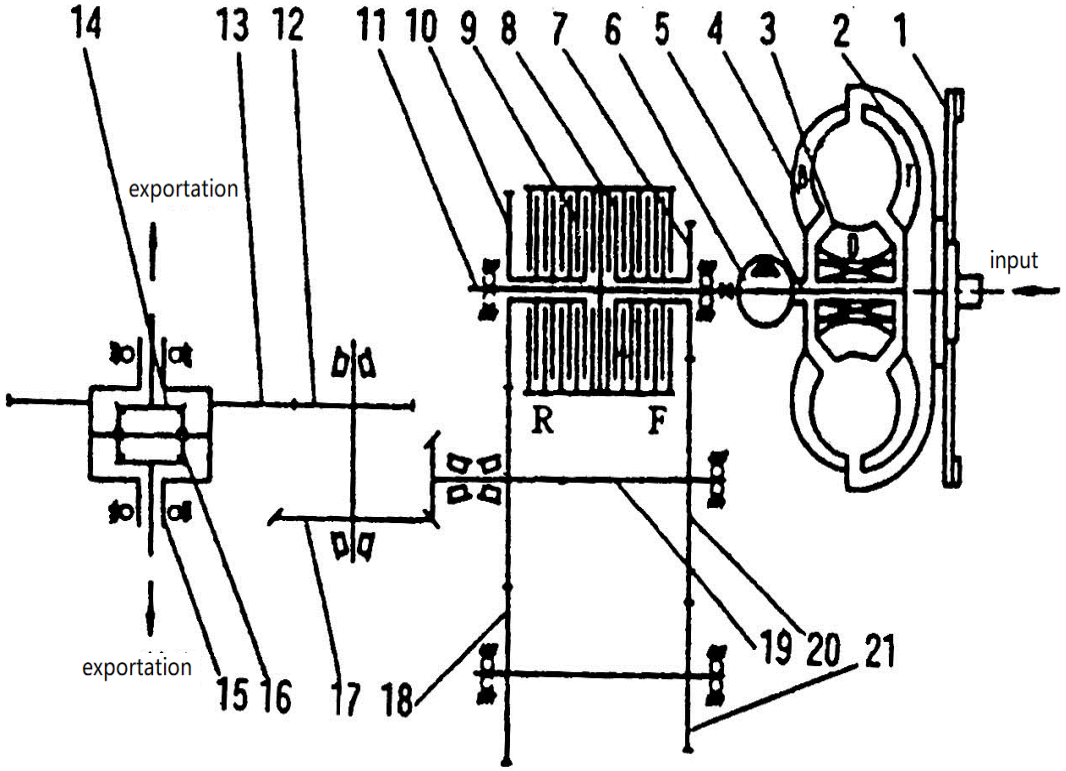


Figure 4-2 Transmission diagram of the hydraulic transmission gearbox

1. Elastic coupling plate 2. Turbine 3. Guide wheel 4. Pump wheel 5. Vortex shaft 6. Oil pump 7. Forward gear 8. Friction plate 9. Spacer plate 10. Reverse gear 11. Input shaft assembly 12. Gear shaft 13. Gear ring 14. Half shaft gear 15. Differential assembly 16. Planetary gear 17. Spiral bevel gear 18. Idler shaft 19. Output shaft 20. Output gear 21. Idler wheel

3.2 Hydraulic oil circuit (see Figure 4-3) When the engine starts, the oil is drawn out from the oil tank (i.e. the bottom of the transmission shell) by the oil filter and flows through the control valve, where the pressure oil is divided into two parts: one part is for the hydraulic clutch; The other part supplies oil to the torque converter. The oil necessary for the operation of the hydraulic clutch flows into the main pressure valve (the pressure of this valve is adjusted to 1.1MPa ~ 1.4MPa) by the main pressure valve

On the one hand, the oil flows further to the micro-valve and the shift control valve, and on the other hand, through the relief valve (the pressure is adjusted to 0.5MPa ~ 0.7MPa) The oil is supplied to the torque converter impeller, the oil coming out of the torque converter is cooled by the oil radiator, and then lubricates the hydraulic disconnector and returns to the tank.

When in neutral, the oil circuit from the shift control valve to the clutch is closed, and the main pressure valve is opened, so that all the oil is lost to the torque converter through the relief valve. When the shift control valve is in the forward or backward position, the oil circuit from the slide valve to the forward clutch or backward clutch is connected to make each clutch operate separately; When one clutch acts, the septum and friction plate in the other clutch are in a separate state, and are lubricated by the cooling oil and the heat is taken away. When the micro-pedal operates the micro-valve, part or most of the oil imported into the clutch is discharged to the fuel tank through the micro-valve stem. At this time, the oil circuit of the torque converter is the same as that in the neutral position.

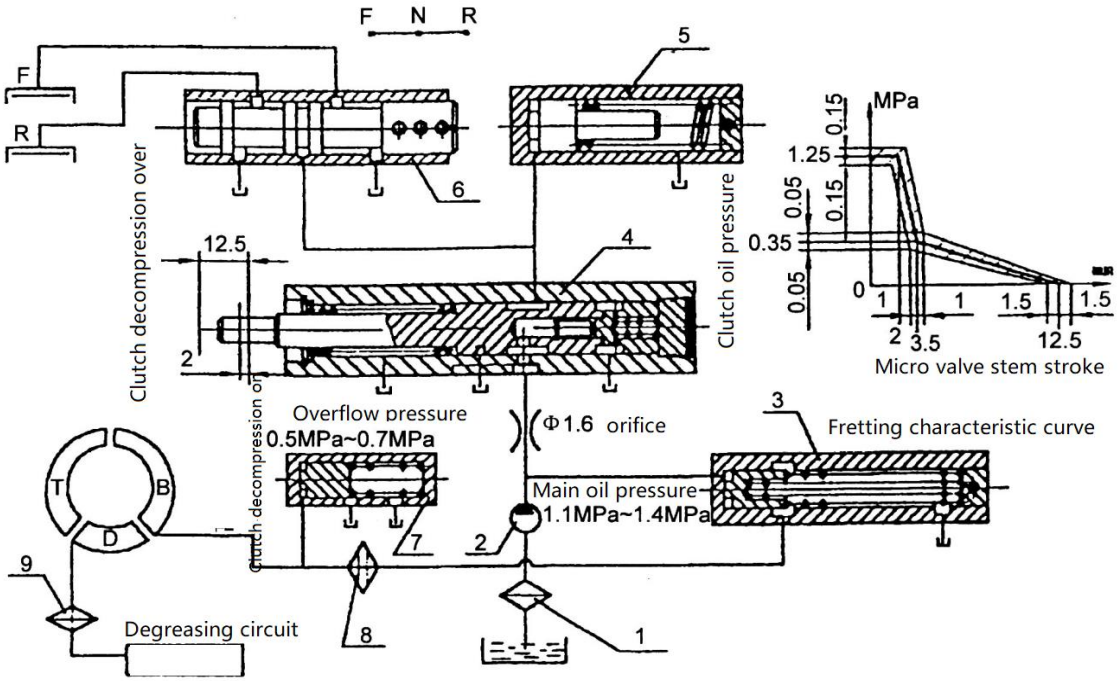


Figure 4-3 Oil circuit diagram of the hydraulic transmission box

1. Crude oil filter 2. Oil pump 3. Main pressure regulator 4. Micro valve 5. Buffer valve

6. Shift operation valve 7. Safety valve 8. Essential oil filter 9. Car cooler

4．Torque converter (see Figure 4-4)

The torque converter is mainly composed of turbine shaft, pump wheel, guide wheel, turbine, elastic connecting plate and other components.

The pump wheel 10 is connected to the engine flywheel through an elastic connecting plate 2. The pump wheel 10 converts the mechanical energy of the engine into the kinetic energy of the working oil, and makes the liquid flow into the turbine 3 at a high speed along the direction of the blade to promote the turbine rotation, input by the turbine shaft, and transmit the torque and speed to the gearbox. The liquid flows out of the turbine and into the guide wheel 4. When the torque converter is in the torque converter stage with large load and low turbine speed, the guide wheel is wedded by one-way clutch and cannot rotate, and the torque of liquid flow acting on the guide wheel is reciprocated on the turbine, resulting in the torque on the turbine equal to the sum of the torque of the pump wheel and the guide wheel, so the output torque is greater than the input torque, resulting in automatic torque converter. When the ratio of turbine speed to pump wheel speed is greater than a certain value, the guide wheel breaks off and spins freely, and the torque change terminates, which is a coupling state.

The torque converter is filled with torque converter oil, and the drive gear is splined and connected to the pump wheel to drive the oil supply pump, which supplies the torque converter and the hydraulic shift transmission. The turbine is splined to the vortex shaft, through which power is transmitted to the power shift gearbox.

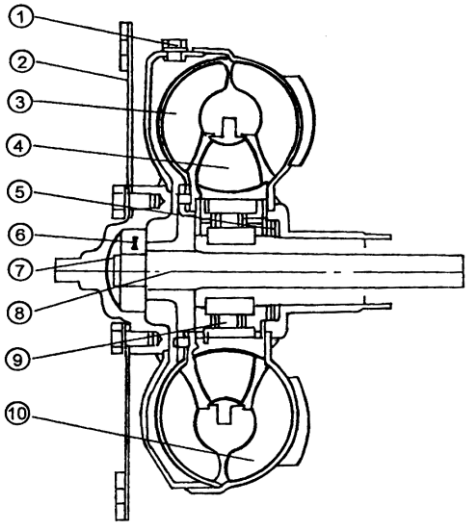


Figure 4-4 Torque converter

1. Oil drain plug 2. Elastic plate 3. Turbine 4. Guide wheel 5. Thrust bearing
6. Ball bearing 7. Stop ring 8. Vortex shaft 9. One-way clutch 10. Pump wheel

5．Hydraulic clutch (see Figure 4-5)

5.1 Overview

The wet multi-disc hydraulic clutch is installed on the input shaft of the hydraulic transmission, and the pressure oil is distributed to the forward or backward clutch through the control valve to realize the forward and backward shift. All gears in the gearbox are normally engaged. Each coupling of the YQX30 clutch assembly consists of four spacers 18 and four friction 19 and a piston 2. Each of the YQX 18 clutch assemblies.The clutch consists of three spacer plates 18, three friction plates 19, a butterfly plate, and a piston 2. (The YQX 18 clutch assembly is only different from the YQX 30 clutch assembly) The piston is equipped with a sealing ring 17 on the outer circle, and an O-type

sealing ring 3 is installed on the input shaft to ensure the seal of the piston when it is working. In neutral, the piston does not move, and the spacer and the friction plate are separated. When shifting, the oil pressure acts on the piston, spacer and friction plate to press against each other, and the power from the torque converter is transferred by friction to the forward gear 4 or reverse gear 6.

The 3.8 tons and 4 tons smaller than the 2-3.5 tons more than two sets of friction plate spacers.

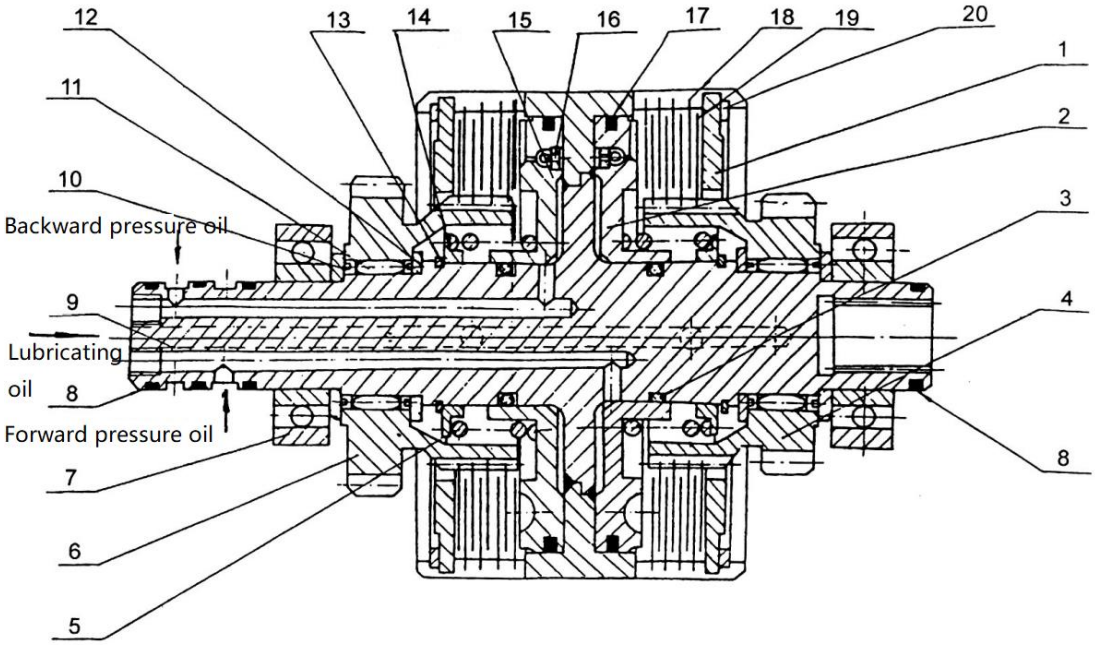


Figure 4-5 Hydraulic clutch

1. End plate 2. Piston 3. O-ring 4. Forward gear 5. Return spring

6. Reverse gear 7. Bearing 8. Seal ring (A) 9. Input shaft assembly 10. Thrust ring (A)

11. Needle roller bearing 12. Thrust ring (B) 13. Elastic retaining ring for shaft 14. Spring seat 15. Steel ball 16. Plug 17. Seal ring (B) 18. Spacer 19. Friction plate 20. Clamp ring

5.2 Decomposition and assembly

①. Take off the left and right ends of bearing 7;

②.Take out the forward gear 4, reverse gear 6, friction plate 19 and spacer plate 18 respectively;

③. Compress both ends of the spring 5, take out the retainer 13, remove the piston 2 and spring 5. Assembly and disassembly are reversed.

Attention:

· The piston cavity and oil passage of the input shaft assembly should be washed, and the other parts should be cleaned except the friction plate.

· Sealing rings (A) and (B) should be replaced if worn or damaged.

· The retaining ring should be replaced.

· The friction plate should be replaced if it is seriously worn or warped.

· The working face of thrust ring (A) and (B) should face towards the gear.

· After assembly, rotate the big and small gears by hand respectively, and they should rotate freely, and there should be no stuck phenomenon.

6. Supply pump (see Figure 4-6)

The oil supply pump is mounted on the torque converter housing. The driving gear 9 is connected with the torque converter pump wheel and is driven by the engine to drive the passive gear 11, the formation of internal gear pump to the torque converter, hydraulic transmission oil supply.

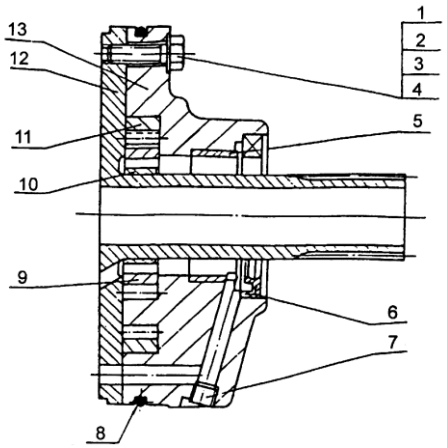


Figure 4-6 Supply oil pump

1. Plug 2. Plug 3. Hole with elastic stop ring 4. Spring 5. Plug
6. O-ring 7. Micro valve stem 8. Spring 9. Elastic retainer for holes 10. Oil seal
11. Pad 12. Micro valve body 13. Micro slide valve

7 . Micro valve assembly

The micro-valve assembly is mounted on the outside of the transmission. The micro-actuating valve stem 7 is connected to the micro-actuating pedal connecting rod. When the micro-actuating pedal is stepped down, the micro-actuating valve stem moves outward. When the micro-actuating valve stem moves outward 2mm, the clutch begins to reduce pressure. When the micro-actuating valve stem moves outward 12.5mm, the clutch drop force decreases to 0, the clutch friction plate and the spacer can not be combined, and the vehicle stops running; When the micro-valve stem moves outward 29mm, the micro-valve stem stroke terminates.

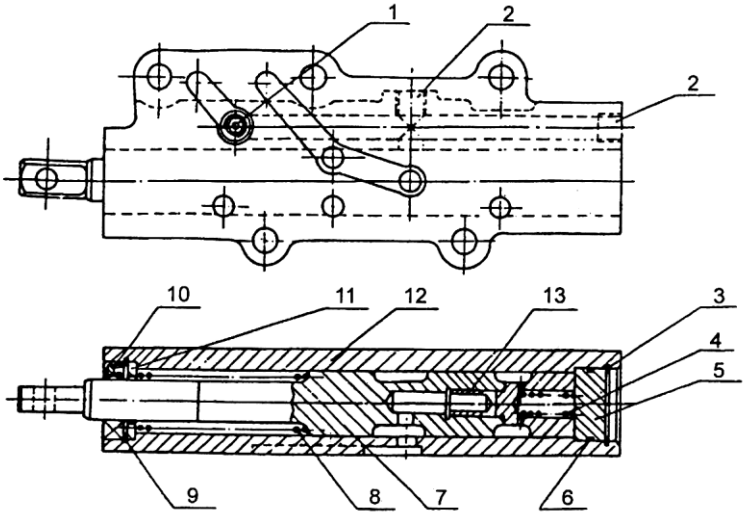


Figure 4-7 Micro-valve assembly

1. Plug 2. Plug 3. Hole with elastic stop ring 4. Spring 5. Plug
6. O-ring 7. Micro valve stem 8. Spring 9. Elastic retainer for holes 10. Oil seal
11. Pad 12. Micro valve body 13. Micro slide valve

8．Cover and control valve assembly

The cover and control valve assembly are mounted on the inside of the gearbox housing cover and consist of housing cover 1 and control valve 3. The case cover is equipped with a variable speed arm shaft 2 and a torque converter oil inlet relief valve 4 to keep the torque converter pressure between 0.5MPa and 0.7MPa.

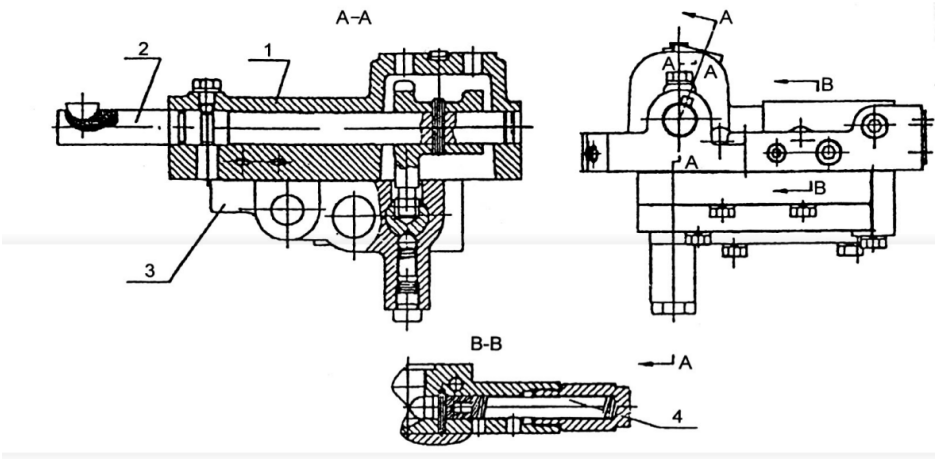


Figure 4-8 Cover and control valve assembly

1. Housing 2. Gearshift arm shaft 3. Control valve assembly 4. Relief valve Control valve assembly is composed of main pressure valve 10, buffer valve 15, shift control valve 1 and other parts, see Figure 4-9.

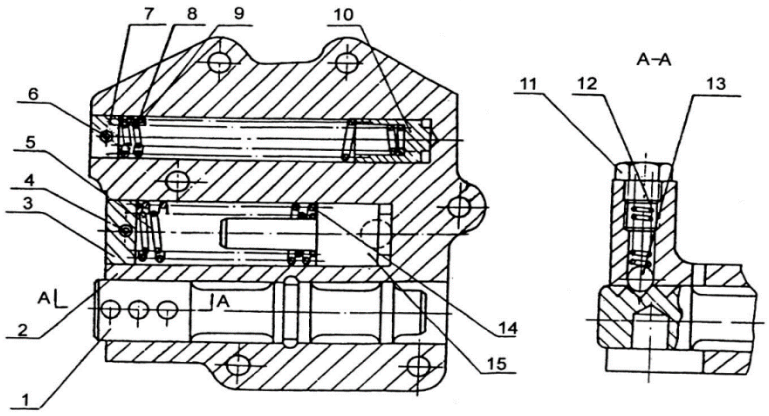


Figure 4-9 Control valve

1. Slide valve 2. Body 3. Plug 4. Elastic cylindrical pin 4×40 5. Spring
6. Elastic cylindrical pin 4×35 7. Plug 8. Spring 9. Spring 10. piston
11. Oil plug 12. Spring 13. Steel ball 14. Spring 15. Valve core

Main pressure valve: the constant pressure valve is used to control the oil pressure of the hydraulic clutch between 1.1MPa ~ 1.4MPa, and the oil is distributed through it
The relief valve is fed into the torque converter.

Buffer valve: the regulating valve, which is located between the micro valve and the shift control valve. When the shift control valve is fully open, the valve works to reduce the impact of the hydraulic clutch engagement.

Shift control valve: Used to distribute pressure oil to the forward or backward clutch to achieve transmission gear shift.

9. Gearbox housing

In addition to the installation of the input shaft and the output shaft and other mechanisms, the transmission housing itself also plays the role of the oil tank, the bottom of the oil filter (I 150 mesh) to filter the oil inhaled for the oil pump, the pipeline oil filter II, the refueling cover and the oil scale are installed above the housing cover.

10. Retarder and differential

The retarder and differential of the hydraulic transmission forklift are the same as those of the mechanical transmission forklift (see sections 3, 5, 6).

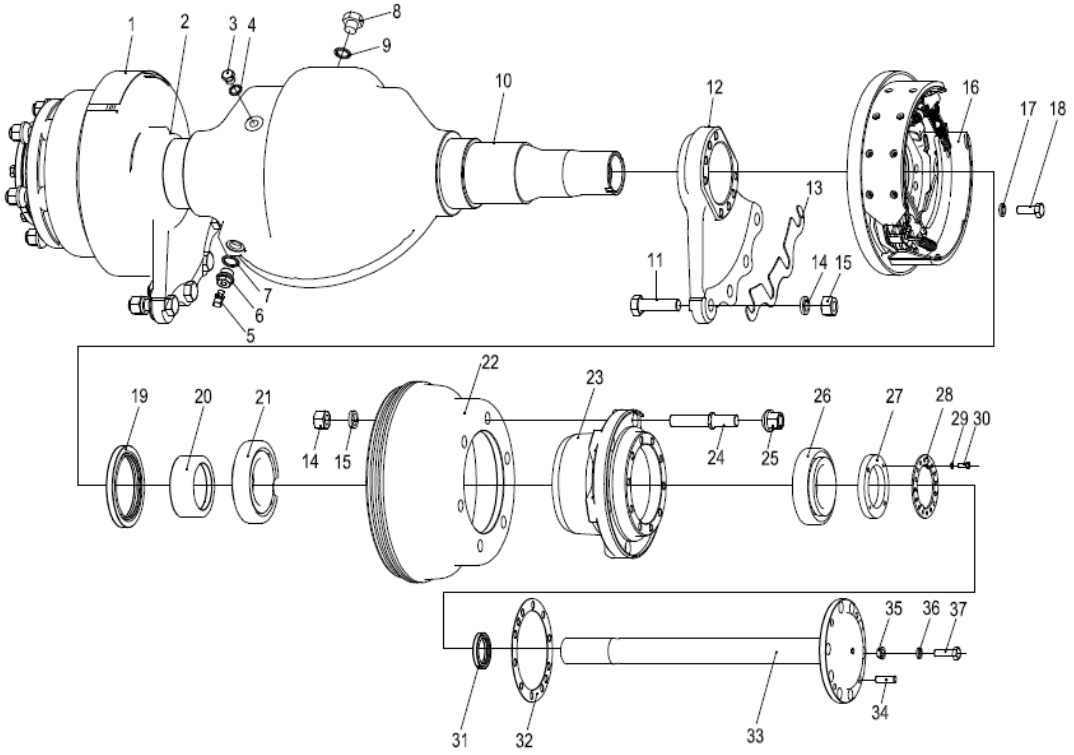
X、Drive axle

1．Date

Drive axle type	Full floating, direct mounting of axle and frame, front wheel drive
Tyre inflation pressure	790kPa 1.0t-1.8t
	860kPa 2.0t-2.5t
	970kPa 3.0t-3.8t
	930kPa X4t
Hub rotation starting pull at hub bolt	10～29
Wheel bearing axial clearance mm	Less than 0.08

2．Fault diagnosis and troubleshooting

condition	Possible cause	elimination
Abnormal noise	· The connecting bolt between the drive axle support sleeve and the frame is loose. · Wheel nuts loose. · Bearing inside wheel hub worn or damaged. · Improper adjustment of bearing in wheel hub. · Half-shaft spline wear. · Inadequate lubrication.	fastening fastening switch adjust switch Add grease
Uneven ride	· Wheel nuts loose. · Wheel deformation. · Bearing inside wheel hub worn or damaged. · The connecting bolt between the drive axle support sleeve and the frame is loose. · Bearings in wheel hub are not adjusted correctly. · Incorrect tire pressure.	fastening switch switch fastening adjust adjust
Oil leakage	· Axle shaft oil seal wear or damage. · The main transmission is not installed correctly. · The oil drain plug is loose.	switch Replacement pad fastening



Drive axle

1. Left brake 2. Left support plate 3. Hexagonal plug 4. Washer 5. Vent plug 6. Hex socket plugs 7. Washer 8. Plug 9. Washer 10. Axle housing 11. Connection bolts12. Right support plate 13. Gasket 14. Washer 15. Nut 16. Right brake 17. Washer 18. Bolt 19. Oil seal 20. Oil seal seat 21. Bearing 7816 22. Brake drum 23. Wheel hub 24. Wheel hub bolts 25. Hub nut 26. Bearing 7815 27. Lock nut 28. Lock plate 29. Washer 30. Bolt 31. Oil seal 32. Paper gasket 33. Half-shaft 34. Pin 35. Press bushing 36. gasket 37. Bolt

3 ．Drive axle assembly removal and installation

Warning: The drive axle is very heavy and should be removed and installed with great care.

1) Prop up the front end of the forklift and support the frame with wooden blocks.
2) Remove the door frame.
3) Gently lift the axle housing with the lifting hoist, and pad the wooden block under the differential housing and transmission.
4) Place the container under the axle housing, loosen the oil plug, and drain the gear oil in the axle housing.
5) Remove the brake connection nuts from the brake subpumps of the left and right brakes (see Figure 5-1).

Note: Plug the brake pipe port to prevent the brake fluid from flowing out.

6) Remove the brake cable on the hand brake rod.
7) Remove the front wheel.
8) Remove half shaft.
9) Support the drive axle with wire rope and lifting device.
10) Remove the fixing bolts between the drive axle support sleeve and the frame (see Figure 5-2).
11) Remove the retaining nut between the axle housing and differential (see Figure 5-3).
12) Remove the drive axle assembly.

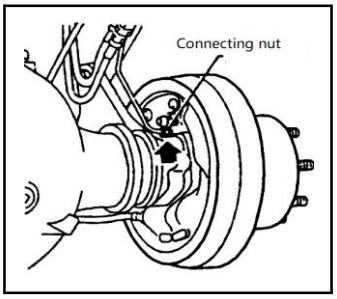


Figure5-1

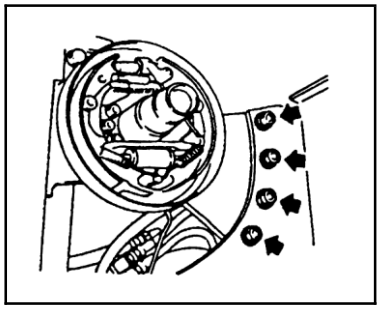


Figure 5-2

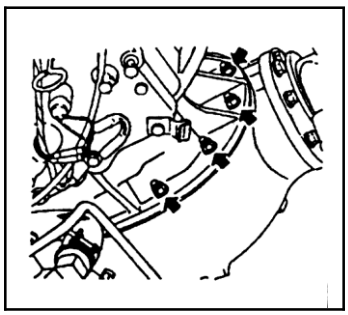


Figure 5-3

13） Remove lock nut and lock piece.
14) Remove wheel hub and brake drum.
15) Remove the support sleeve and brake assembly from the drive axle casing.
16) Remove the oil seal from the drive axle casing.
17） The installation order of the drive axle assembly is opposite to the disassembly order, but note the following points:
①.When installing the support sleeve and brake assembly, a layer of grease should be applied to the drive axle sleeve;
②.Add 1/3 ~ 2/3 volume of grease into the wheel hub, and then install it on the casing;
③.When the oil seal is installed, turn the front of the oil seal towards the inside of the forklift;
④.After the oil drain plug is cleaned, wrap sealant (PVC tape, white) for installation;
⑤.Refill the axle housing with gear oil. Tighten the air plug after it is dredged.

GL-5 85W/90 Gear oil (L)	2.8	1-1.8t Hydraulic car
	6	1-1.8t Mechanical car
	3.2	2-X4t Hydraulic car
	8	2-X4t Mechanical car

The vent plug should be dredged frequently to prevent pressure buildup in the axle housing.

4．Axle and hub

Disassembly

1) Prop up the front end of the forklift and support the frame with wooden blocks;

2) Remove the front wheel and axle;

3) Remove the lock nut and lock piece. Use tools on board;

4) Remove the brake drum and wheel hub (see Figure 5-4);

If it is difficult to remove: a. Remove the rubber plug from the adjustment hole, reach into the adjustment hole with a flat-head screwdriver, and pull up to adjust about 10 teeth of the ratchet to shrink the brake shoe (see Figure 5-5). b. Or knock the brake drum outward with a copper rod or wooden hammer。

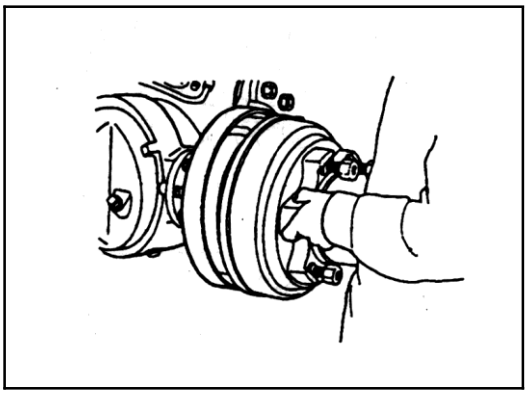


Figure5-4

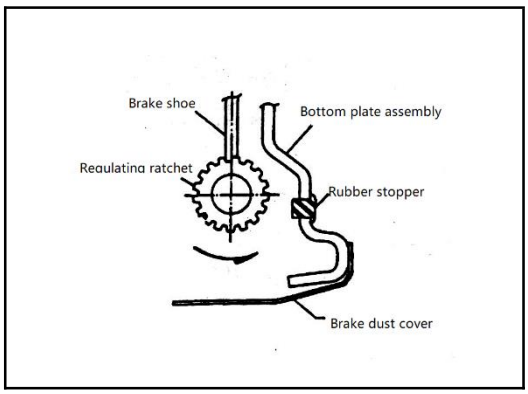


Figure 5-5

5） Use wood hammer and copper rod to evenly hit the surrounding part of the oil seal, and remove the oil seal and the inner bearing together;

Shaft spline burst or step wear	change
Bearings are stuck, scratched, noisy, rusted, or rollers are turned	change
Hub burst	change
Oil seal failure	change

6） Use a wooden hammer to evenly knock out the bearing outer ring and remove the bearing seat outer ring from the hub.

Note: Be careful not to damage the oil seal and outer ring.

inspection

fitting

The installation sequence is opposite to the removal sequence.

5 . Adjusting bearing

1) Grease the tapered roller bearing;

2) Tighten the lock nut of the tapered roller bearing in the hub until the hub cannot be turned with one hand;

3) Turn the lock nut in the opposite direction from the above position 600;

4) Then turn the wheel hub in the opposite direction for 2 to 3 turns so that the bearing seat is closed;

5) Tighten the lock nut again until it cannot be turned with one hand. Then turn the nut in the opposite direction 600;

6) Install the lock piece.

7) Rotate the front and back of the wheel 2-3 turns respectively to check whether the rotation starting tension meets the standard; Rotation starting force: 10N ~ 29N. (See Figure 5-6.)

8) Measure the axial clearance of the wheel hub to see if it meets the standard. The axial clearance is less than 0.08mm (see Figure 5-7).

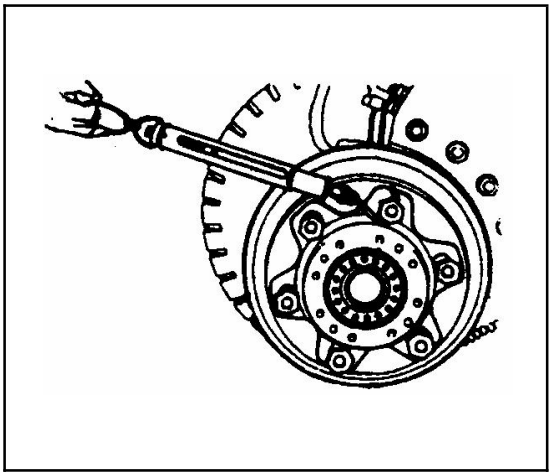


Figure5-6

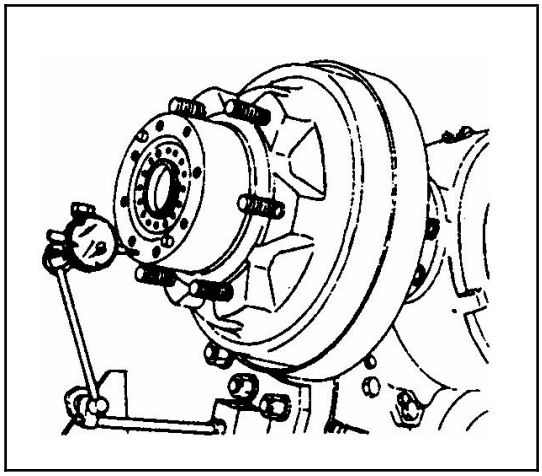


Figure 5-7

XI、Steering axle

1．General data

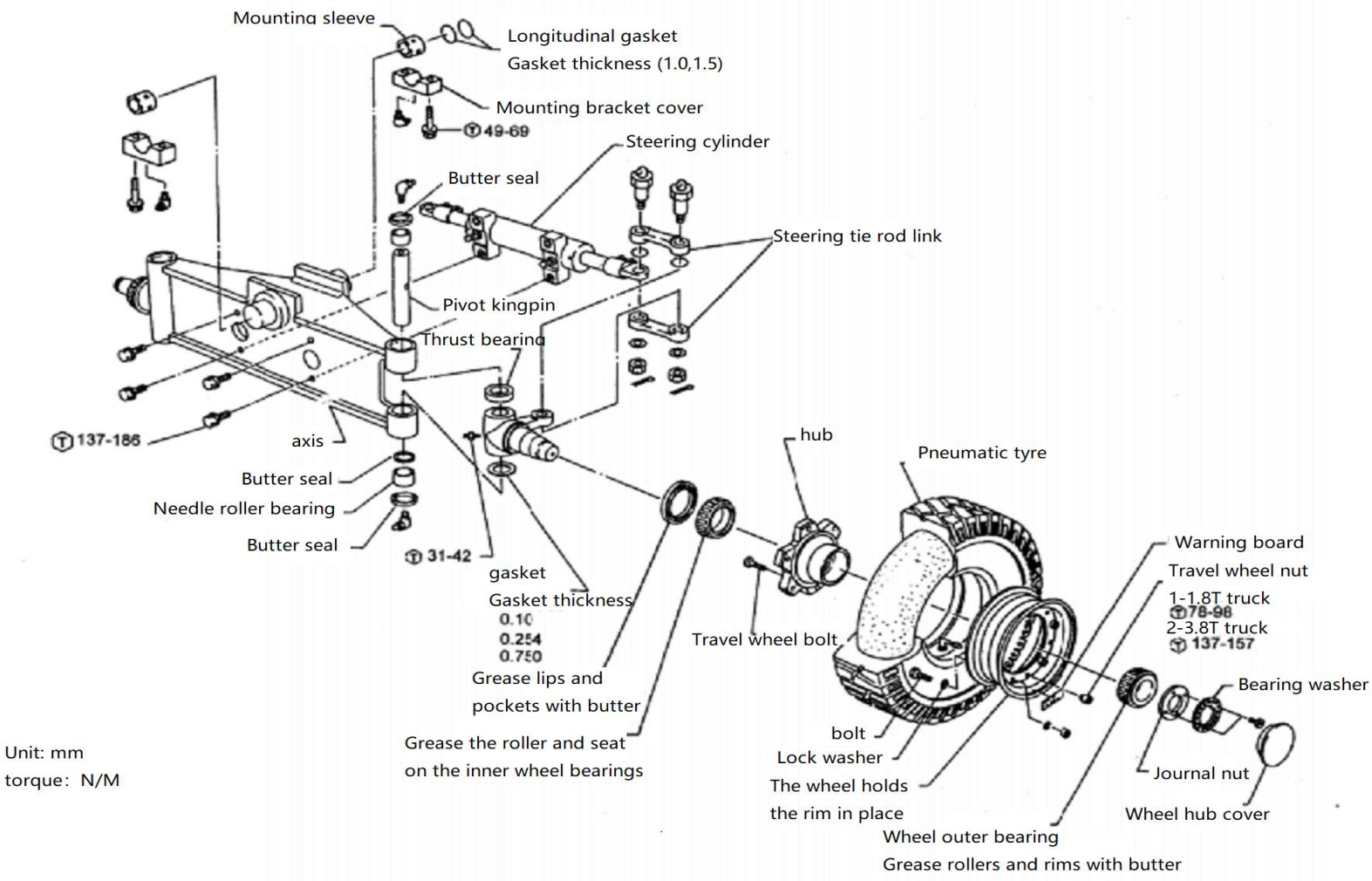
Bridge type center support, back transition			
Steering Angle	Inside Angle	1t-1.8t	79.5°
		2t-3.8t	77.8°
	Outside Angle	1t-1.8t	56°
		2t-3.8t	54.3°
Tyre inflation pressure	1000kPa 1.0t-1.8t		
	860kPa 2.0t-2.5t		
	790kPa 3.0t-X4t		

Center of axis

Longitudinal clearance （mm） 0 ~ 1	
Bridge end shaft adjusting gasket thickness（mm）	0.5,1.0,1.6
Part number	N163-220020-000

2．Fault diagnosis and troubleshooting

condition	Possible cause	exclude
Erratic running	· Wheel nuts loose · Wheel bearing exceeds adjustment range · Bridge end shaft adjustment gasket is not installed correctly · Steering system failure	fastening adjust adjust See "Steering System" section
noise	· Insufficient lubrication · Loose bolts and nuts · Bridge end shaft adjustment gasket is not installed correctly · Joint bearings at both ends of the connecting rod are damaged	Apply and inject calcium base grease fastening adjust switch



Unit: mm
torque: N/M

3．Steering axle

Remove hub

1) Lift the forklift with a thousand pounds and support it with wooden blocks;

2) Remove the tire;

3) Remove the hub cap;

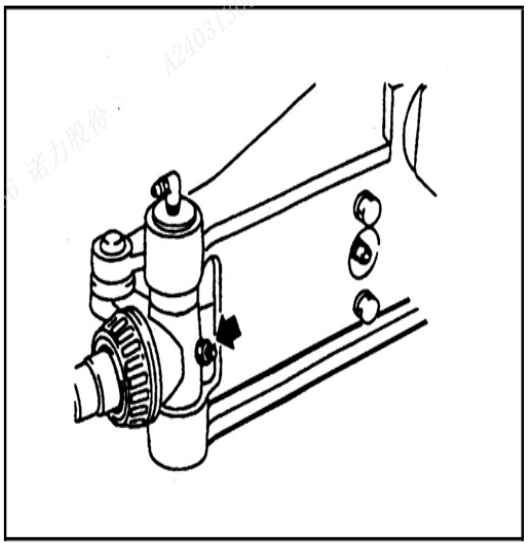
4) Remove the knuckle nut;

5) Pull out the hub assembly;

6) Remove the bearing inner ring.

Note: a. Do not drop the bearing inner ring.

b. Be careful not to damage the seal.



4．Steering kingpin and steering knuckle

1) Remove the connecting rod;

2) Loosen the locking bolt (see Figure 6-2);

3) Remove the nozzle of the steering kingpin;

4) Remove the steering kingpin;

Note: Push the steering kingpin to prevent falling (see Figure 6-3).

5) Remove the steering knuckle, thrust bearing, dustproof shell and gasket.

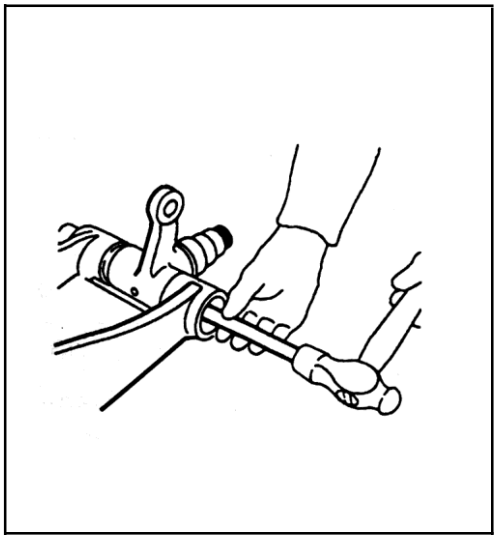


Figure 6-3

Detection

1) Replace the steering knuckle if it breaks;

2) If the surface of the needle roller bearing is rusted or cracked, replace the bearing

3) If the steel sleeve is deformed, out of round or broken, it will be replaced;

4) The thrust bearing and dustproof shell are damaged and replaced.

The installation sequence is the opposite of the disassembly, but note that:

1) Be sure to insert the steering knuckle from the lower end;

2) Install thrust ball bearings with tight ring under and cage and loose ring on top. The inner wall of the dust-proof shell, the loose ring and the tight ring are coated with grease respectively;

3) The axial clearance is obtained by increasing or decreasing the gasket. Axial clearance is less than 0.20mm;

4) Sealing rubber ring with font facing outward. Grease the roller and retainer of the roller bearing, and grease the sealing rubber lip surface and the concave bag;

5) Inject enough grease into all oil nozzles.

5. Adjusting wheel bearing

1) Slowly turn the hub and tighten the knuckle nut until the hub cannot be turned with one hand;

2) On the basis of the above position, turn the knuckle nut in the opposite direction 1/6 ~ 1/4 turns. The starting force at the measuring hub bolt is 10N-30 N;

3) Ensure that the hub rotates smoothly, and make its axial clearance within the specified value, and the axial clearance is less than 0.10mm.

XII、Steering system

1．Date

Turning system type			Rear wheel steering with power steering, power steering	
			2t、2.5t、3t、3.5t、3.8t	1t、1.5t、1.8t
Cycloidal fully hydraulic steering gear	Model number		530-1322	/
	Displacement ml/r		100	/
	Connection form		Internal spline	Internal spline
	peculiarity		Open core, low torque	Open core, low torque
Steering cylinder	Cylinder	mm	Φ65	Φ50
	Piston rod diameter	mm	Φ40	Φ30
	journey	mm	195	160
Steering wheel diameter		mm	4300	4300

2．Steering system troubleshooting

question	Cause analysis	Elimination method
The steering wheel won't turn	The oil pump is damaged or faulty	switch
	The diverter valve is blocked or damaged	Clean or replace
	Damaged hose or joint or blocked pipe	Replace or clean
Hard steering	The diverter valve pressure is too low	Adjusting pressure
	There is air in the oil circuit	Air removal
	Steering gear reset failure, positioning spring broken or insufficient elasticity	Spring replacement
	The leakage in the steering cylinder is too large	Check piston seal
Forklift snaking or swinging	Excessive steering flow	Adjust the diverter valve flow
Abnormal noise	The tank is low	refuel
	Blocked suction pipe or oil filter	Clean or replace
Oil leakage	Steering cylinder guide sleeve seal is damaged or line or joint is damaged	switch

3 . summarize

The steering system is mainly composed of steering device and steering cylinder.

3.1 The steering device (see Figure 7-1) mainly includes a cycloidal fully hydraulic steering device, steering column and steering wheel. The steering column and the steering wheel can be adjusted back and forth, which can be adjusted

The Angle is 6° to suit the needs of different drivers.

In the engine off state, gently rotate the steering wheel with 1kg force, after letting go, the steering wheel should be able to automatically return to about 10°.

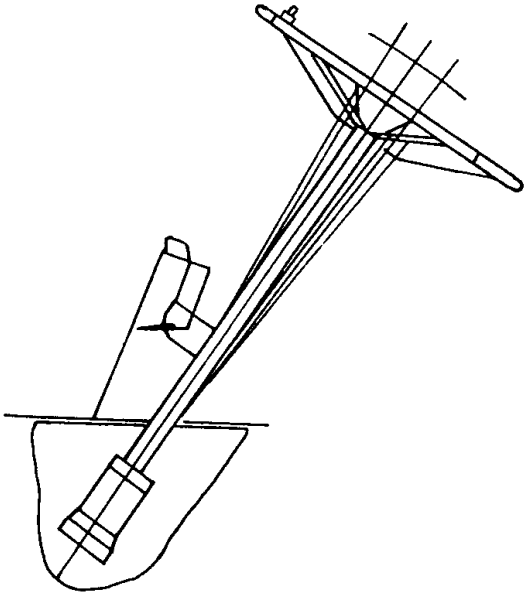


Figure 7-1 Steering gear

3.2 **Full hydraulic steering gear** (see Figure 7-2)

Full hydraulic steering gear, its structure is shown in Figure 7-2.

During power steering, the pressure oil enters the fixed rotor pair through the spool valve sleeve pair, pushes the rotor to follow the steering wheel, and presses the oil into the left or right cavity of the rotating cylinder, and the cylinder piston rod pushes the steering wheel to achieve steering.

When the engine is turned off, the oil pump does not supply oil. The steering wheel drives the rotor through the spool, valve sleeve and coupling. At this time, the rotor and the stator are equivalent to a oil pump, and the oil is input to the steering cylinder to implement manual steering.

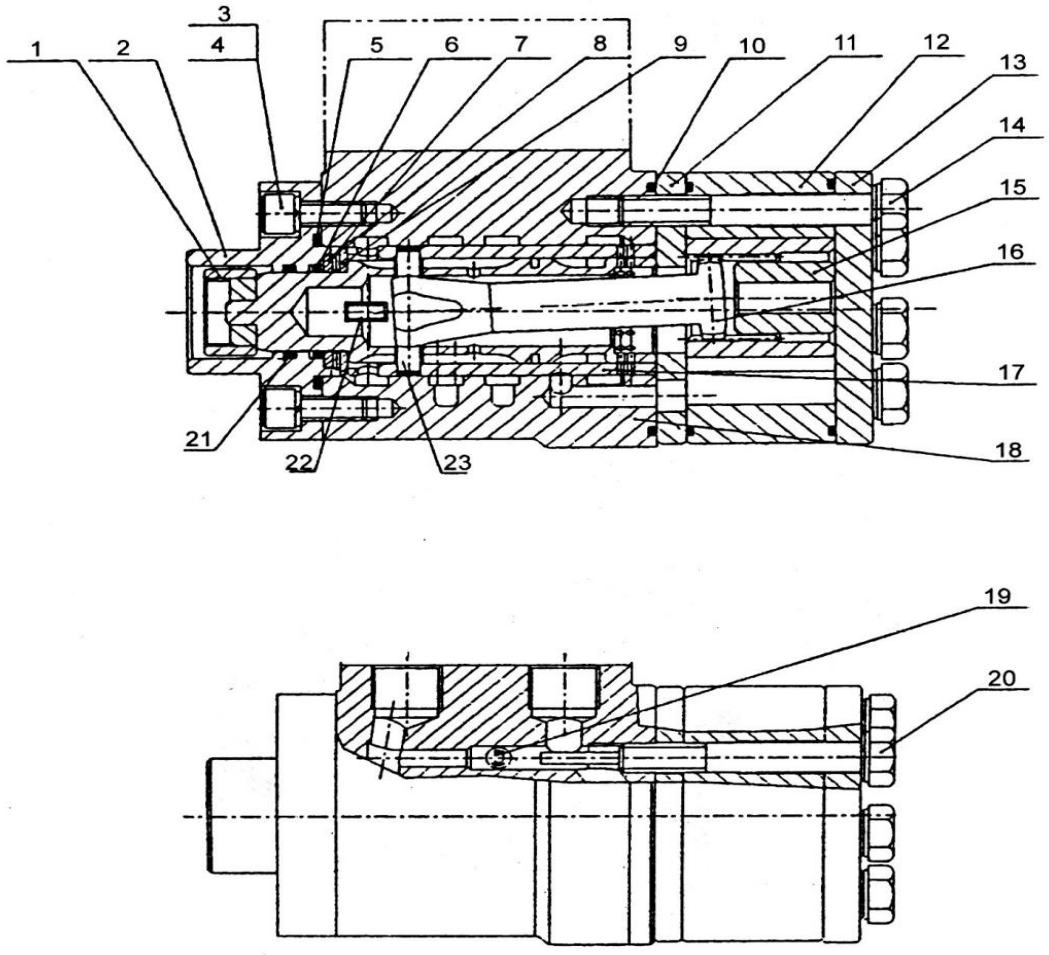


Figure 7-2 cycloidal fully hydraulic steering gear

1. Connecting block (no internal spline connection) 2. Front cover 3. Screws 4. Spring plate 5. O-type sealing ring6. X sealing ring 7. Stop ring 8. Thrust bearing 9. Slip ring 10. O sealing ring 11. Spacer 12. Rotor pair 13. Back cover 14. Bolts 15. Stop block 16. Linkage shaft 17. Spool valve sleeve pair 18. Shell 19. Steel ball 20. Limit bolt

3.3 Steering cylinder (see Figure 7-3)

The steering cylinder is a double-acting through type, both ends of the piston rod are connected to the steering joint by connecting rods, and the pressure from the fully hydraulic steering unit The oil makes the piston rod move left and right through the steering cylinder, so as to achieve left and right steering.

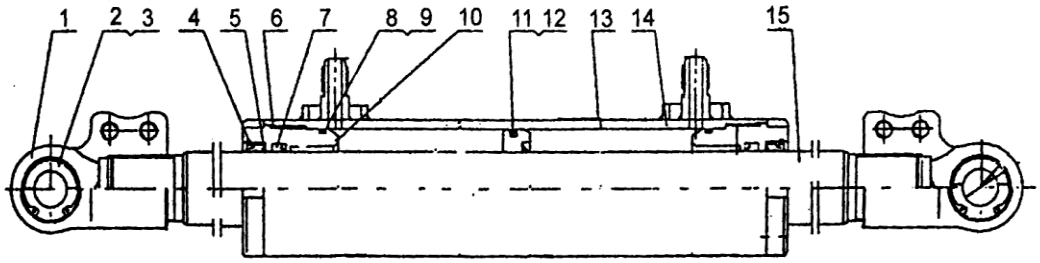


Figure 7-3 Steering cylinder

1. Earring 2. Hole elastic stop ring 3. Radial joint bearing 4. Steel wire stop ring 5. Dust ring 6. O-ring 7. O-ring 8. Protective ring 9. O-ring 10. Guide sleeve 11. O-ring 12. Glace ring 13. Label 14. Cylinder 15. Piston rod

4．Steering system installation

When installing the steering system, note:

1) Hydraulic joints, bolts and hose should be loaded very cleanly;

2) Check whether the oil pressure pipeline layout is correct and whether the left and right steering is inverted;

3) Turn the steering wheel around and hit it to see whether the left and right force is uniform and whether the rotation is smooth;

4) Jack up the rear wheel, slowly turn the steering wheel left and right, repeated several times, to remove the air in the hydraulic line and the cylinder.

In the engine off state, gently rotate the steering wheel with 1kg force, after letting go, the steering wheel should be able to automatically return to about 10°.

See Figure 7-1.

XIII、Brake system

1．Fault diagnosis and correction

breakdown	Possible cause	Take measures to correct the
Insufficient braking force	Brake line leakage There's air in the brake pipe There is water or oil on the friction lining The friction lining has uneven contact or wear degree The main brake pump or sub-brake pump is not functioning properly	Correct and refuel Air removal Dry or replace Grind or replace Correction or replacement cleanse
Brake unbalance (Forklift deflects to one side)	Tire pressure is uneven Brake misalignment There is oil or water in the brake friction There's a foreign object in the brake drum Friction lining surface damage Friction lining contact is incorrect Friction lining wear The brake drum is worn, warped, rusted or The brake pump is not working properly The brake shoe is not sliding correctly The guard bolt is loose Guard plate warping Wheel bearing adjustment is incorrect Tubing clogging	adjust adjust Dry or replace cleanse Grind or replace Grinding or correction switch Correction or replacement Correction or replacement adjust Tighten or replace switch Adjust or replace cleanse
Brake bite	The brake pedal has no free travel The brake shoe is not sliding correctly The brake subpump is not operating correctly Piston cup damaged The return spring is weak or broken Brake master pump return hole blocked Tubing clogging	adjust adjust Adjust or replace switch switch cleanse cleanse
Brake noise	The surface of the friction plate is hardened or impurities are attached to it The bottom plate is deformed or the bolt is loose Brake shoe deformation or incorrect installation Friction plate wear Wheel bearing loose	Repair or replace Repair or replace Repair or replace switch Repair

2．summarize

The brake system is a front two-wheel brake, which is composed of foot brake and hand brake, and foot brake is composed of brake master pump, brake and brake pedal mechanism.

2.1 Brake master pump

The brake master pump of the 2.0t-3.8t mechanical forklift truck consists of a seat, a check valve, a return spring, and a cup piston and auxiliary cup. The end is fixed with a stop washer and stop wire, and the outside is protected by a rubber dust cover. The main pump piston is operated by the brake pedal through the push rod. When the brake pedal is stepped down, the push rod pushes the piston forward, and the brake fluid in the pump body flows back to the oil storage tank through the oil return port until the main skin bowl blocks the oil return hole. After the main skin bowl is pushed through the oil return port, the brake fluid in the front chamber of the main pump is compressed and the check valve is opened, which flows to the sub-pump through the brake pipeline. In this way, each sub-pump piston extends outward. The brake shoe friction plate and the brake drum contact to achieve the effect of deceleration or braking, at this time, the rear chamber of the piston is supplemented by the brake fluid from the oil return port and the oil inlet port. When the brake pedal is released, the piston is pressed back by the return spring, and the brake fluid in each brake pump is also compressed by the brake shoe return spring, so that the brake fluid returns to the main pump (piston front chamber) through the check valve, the piston returns to the original position, and the brake fluid in the main pump flows back to the oil tank through the oil return port. The pressure of the check valve is adjusted to a certain proportion of the remaining pressure in the brake line and brake sub-pump, so that the pump skin bowl is correctly placed to prevent oil leakage and eliminate the possible air blockage during emergency braking.

The brake master pump of 1.0t-1.8t mechanical forklift truck works similarly.

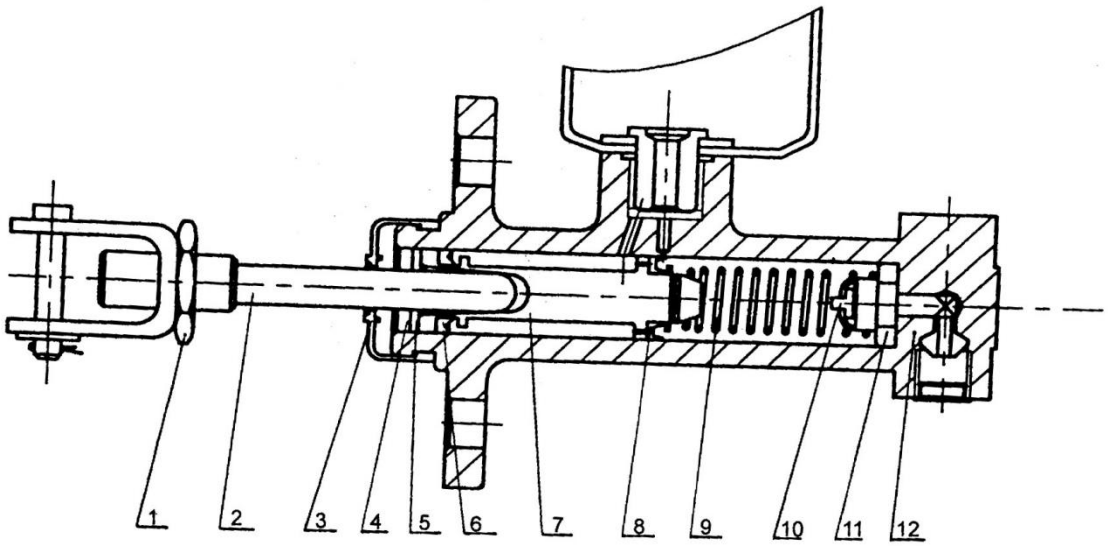
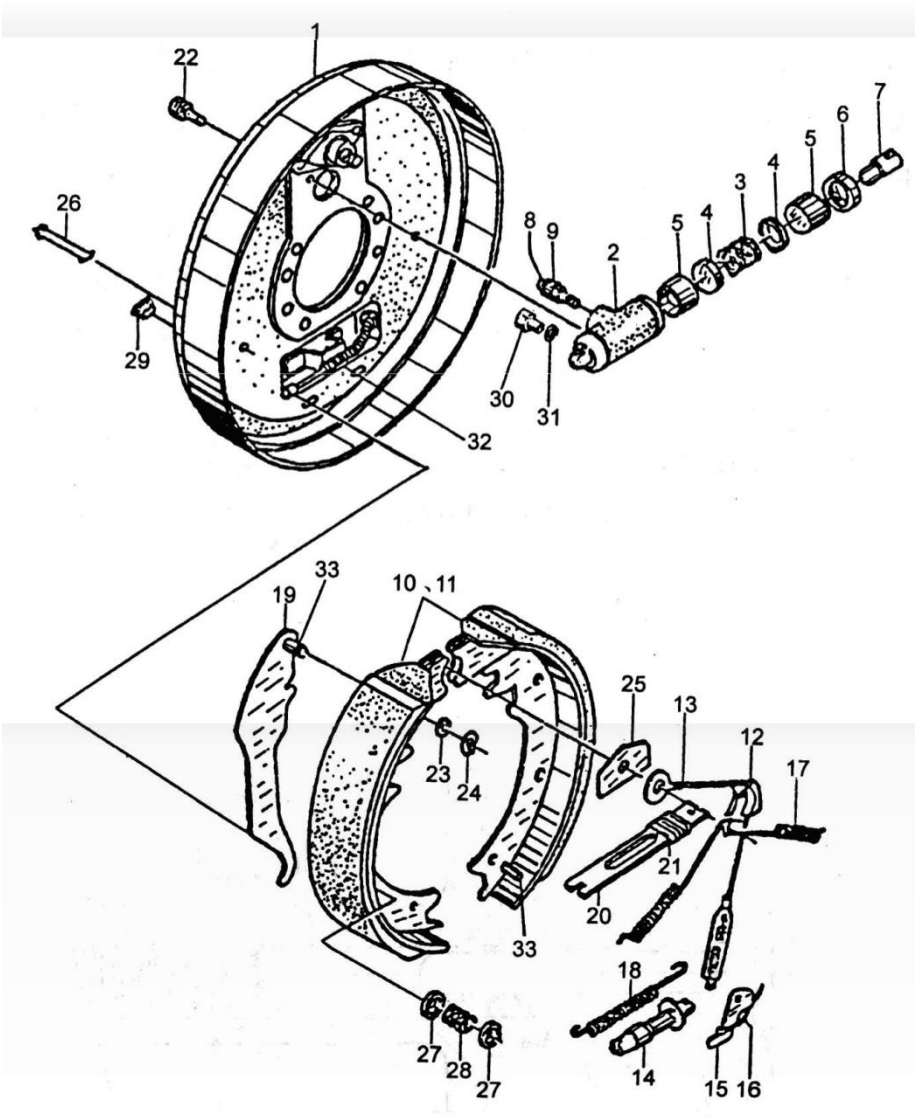


Figure 8-1 Brake master pump

1. Lock nut 2. Push rod 3. Dust cover 4. Stop wire 5. Stop washer
6. Auxiliary cup 7. Piston 8. Main cup 9. Spring 10. Check valve
11. Seat 12. Pump body

2.2 Forklift brake

Figure 8-2 shows the right brake structure of 1.0t-1.8t and 3t-3.8t forklift trucks. The right brake structure of 2.0t-2.5t forklift truck is similar.



1. Left brake 2. Left support plate 3. Hexagonal plug 4. Washer 5. Vent plug
6. Hex socket plugs 7. Washer 8. Plug 9. Washer 10. Axle housing
11.Connection bolts 12. Right support plate 13. Gasket 14. Washer 15. Nut
16. Right brake 17. Washer 18. Bolt 19. Oil seal 20. Oil seal seat
21. Bearing 7816 22. Brake drum 23. Wheel hub 24. Wheel hub bolts 25. Hub nut
26. Bearing 7815 27. Lock nut 28. Lock plate 29. Washer 30. Bolt
31. Oil seal 32. Paper gasket 33. Half-shaft 34. Pin 35. Press bushing
36. gasket 37. Bolt

2.3 Methods for replacing brake shoes

1) Stop the forklift on the level concrete floor.

2) Start the engine and raise the fork about 100 mm.

3) Put wooden blocks on the back of the rear wheel to prevent the forklift from moving backward.

4) Loosen the wheel nuts 2 to 3 turns one by one.

5) Tilt the door frame back to the bottom, and place solid wood blocks on each side of the lower part of the outer door frame.

 **Warning:**

Do not let the block touch the tire.

6) Lean the door frame forward until the tire is off the ground. Note: After the front wheel is lifted from the ground, remove the wheel nuts.

7) Add cushion wood under both sides of the front end of the frame to support the forklift.

8) Engine failure.

9) Remove the tire nut and tire. Remove half shaft, lock nut, lock piece.

10) Remove wheel hub and brake drum.

11) Replace new brake shoes.

12) Reinstall wheel hub and brake drum, lock nut, lock piece. Adjust the bearing clearance.

13) Adjust the gap between the shoe and the brake drum by rotating the wheel in the opposite direction while pressing the brake pedal several times.

14) Remove each pad: Remove each pad in the reverse order as inserted.

15) After confirming that there are no people and obstacles near the forklift, reverse the forklift at a speed of 2km/h ~ 3km/h, and step on the brake pedal 2 ~ 3 times.

2.4 Hand brake

The hand brake uses a hand-pulled flexible shaft mechanism, which together with the foot brake uses an automatic power shoe brake acting on the front wheel. Use the hand brake only when the forklift is parked.

Before adjusting the hand brake, make sure the transaxle brake system is functioning properly.

1) Adjust nut B so that thread length L is equal to 15.5mm, then tighten lock nut A.

2) Adjust nut A until the handle force (point P in the Q direction) is15kg~20kg.

3) Ensure that part E is not tilted when the handle is locked (the difference between S1 and S2 is less than 2mm); (See View V for details).

4) When the hand brake rod is in the locked position, the brake cable bracket must not tilt. If there is a tilt, readjust the length of L.

5) After the hand brake pull rod is adjusted correctly, release the hand brake pull rod to ensure that the brake is completely released.

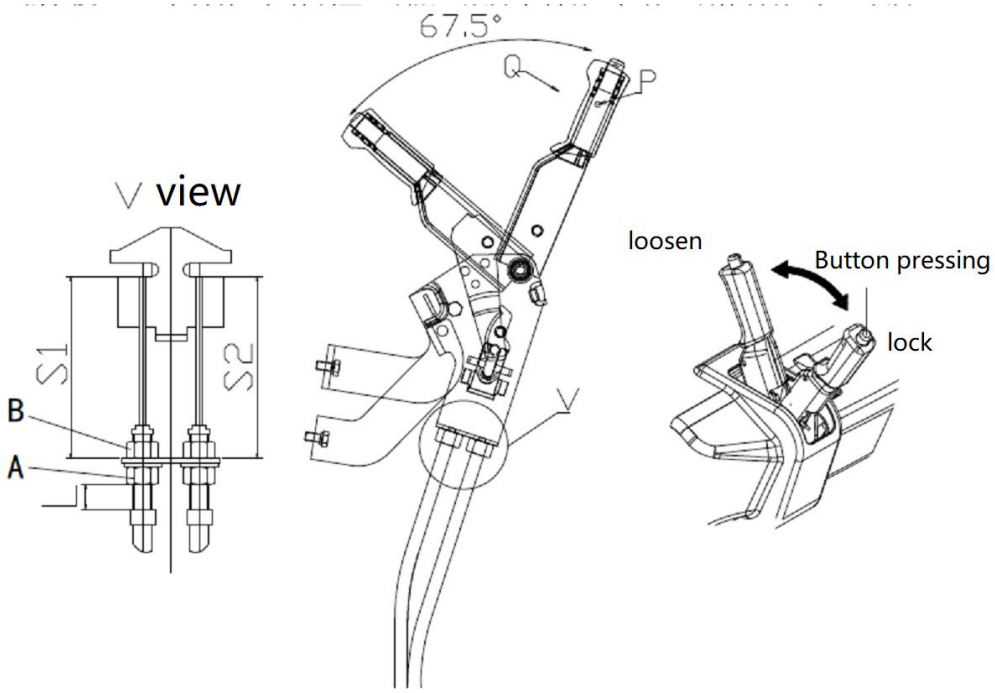


Figure 8-3 Hand brake

2.5 Brake schematic diagram

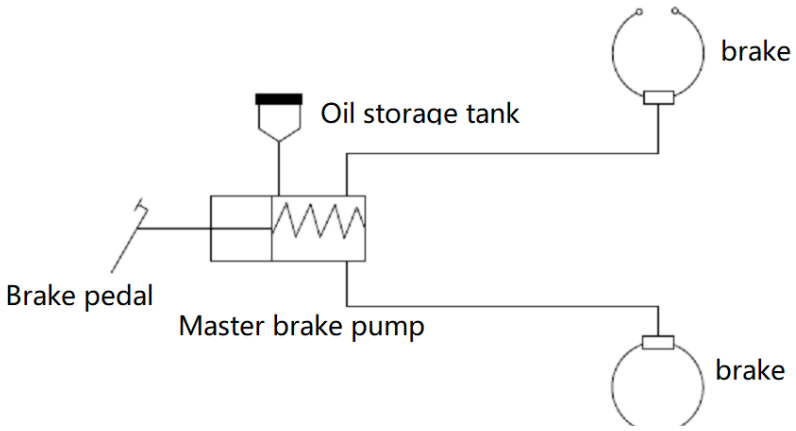


Figure 8-4 Series A 1-x4t internal combustion balance (drum brake)

XIV、Hydraulic system

1．Date

Main oil pump

Forklift model	1.0t-1.8t	2.0t-3.8t
Model number	CBT-F425-AFH6L	CBHZG-F32-ALH6L CBHZG-F32-ALΦ(AG32 car only)
type	Gear type	Gear type
Driving mode	Engine power output gear drive	Engine power output gear drive
displacement（ ml/r)	25	32
Rotational speed（r/min）	500～3000	400～3500
Output pressure (rated/Max) MPa	20/25	20/25

Forklift model	X4t
Model number	CBHZG-F40-ALΦ13L
type	Gear type
Driving mode	Engine power output gear drive
Rotational speed（ ml/r)	40
Rotational speed（r/min）	600～3000
Output pressure (rated/Max)MPa	20/25

Multiway valve

type			Double slide valve with overflow diverter valve and tilt self-locking valve
Adjusting pressure		MPa	1t: 13 1.5t: 15.5 1.8t-X4t: 18.5 ±0.25
Rated flow L/min			65-70
Diverting valve	stress	MPa	8.8±0.25
	Flow rate	L/min	1t-1.8t：8±1 2t-X4t: 12±1

2 ． Fault diagnosis and correction

Main oil pump

breakdown	Possible cause	Corrective action
The oil pump does not pump out	The tank is low	Fill to specified oil level
	The suction pipe or filter is blocked	Clean the oil circuit and fuel tank. If the hydraulic oil is dirty, it will be replaced
The output oil pressure of the pump is low	Bearing wear; The retainer and O-ring are damaged	Replace faulty parts
	Safety valve adjustment error	Use a pressure gauge to increase the pressure
	There is air in the oil pump	· Tighten loose joints on suction side · Add hydraulic oil to the tank · Check oil pump seal · After the air bubbles in the fuel tank
Oil pump noise	The hose on the suction side is distorted or the filter is blocked, resulting in holes	Adjust or replace hoses and clean filters
	Air is drawn through the loose joint on the suction side	Retighten each joint
	Cavitation is caused by high viscosity of hydraulic oil	·Replace with a new hydraulic oil whose viscosity is appropriate for the speed of the pump · Work only when the oil temperature is normal
	There are bubbles in the hydraulic fluid	Check the cause of the bubbles first, and then take action
Oil pump leakage	The oil seal of the oil pump is damaged, the O-ring is damaged, or the sliding surface of the oil pump is worn	Replace faulty parts

Multiway valve

breakdown	Possible cause	Corrective action
The safety valve pressure is unstable or cannot be adjusted	The pressure adjusting screw is loose	Adjust pressure and lock again
	The pressure regulating spring is deformed or damaged	switch
	The valve core of the safety valve is worn or stuck	Replace or disassemble and reassemble
	Pump failure	Service pump
Engine off, operate front and rear tilt joystick, door frame forward tilt	Tilt lock valve worn or damaged	Replace the spool and tilt lock valve as assemblies
	Tilt lock spring breaks	Spring replacement
	Tilt valve stem O-ring damaged	Replace the O-ring
The frame is unstable when tilted	Tilt reducing valve is out of order	Replace the tilt pressure reducing valve assembly
The fork rack drops significantly when the lifting lever is in the neutral position	Excessive wear clearance between valve body and stem	Replace stem with required clearance
	Valve stem position is not aligned	Keep the stem position neutral
	Cylinder seal failed	Maintenance cylinder
	Overload valve is worn or stuck with dirt	Replace or clean the overload valve
Reset failure	The reset spring is damaged or deformed	Spring replacement
	There is dirt between the stem of the valve body	cleanse
	Control mechanism stuck	adjust
	The parts of the reset position are not coaxial	Reassemble, keep coaxial
External leakage	The O-ring is damaged	switch
	The oil connector is poorly sealed	Check the tightening and sealing of the corresponding parts
	Seal plate loose	Clean the seal plate and retighten the bolts
	The safety valve lock nut and the plate are connected with each other	fastening

3 . Main oil pump

3.1 2.0t-3.8t main oil pump

The hydraulic systems of 1-1.8t W10 forklifts and 2.0t-X4t forklifts use SGP1 or CBHZ (G) gear pumps as working pumps. The gear pump is an external gear pump with automatic axial clearance compensation and radial hydraulic balance. The gear adopts a special gear with asymmetric tooth shape, which has the characteristics of small volume and low noise compared with the symmetrical tooth shape gear with the same displacement. The shaft sleeve is equipped with DU bushing, the side plate is bimetal material, the front and rear covers are aluminum die-cast parts, and the intermediate is cast iron parts, which improves the performance index and reliability.

SGP1 or CBHZ(G) left-hand gear pump structure is shown in Figure 9-1, SGP1 or CBHZ(G) right-hand gear pump structure is shown in Figure 9-2. They differ only in 3 font seals facing the opposite direction.

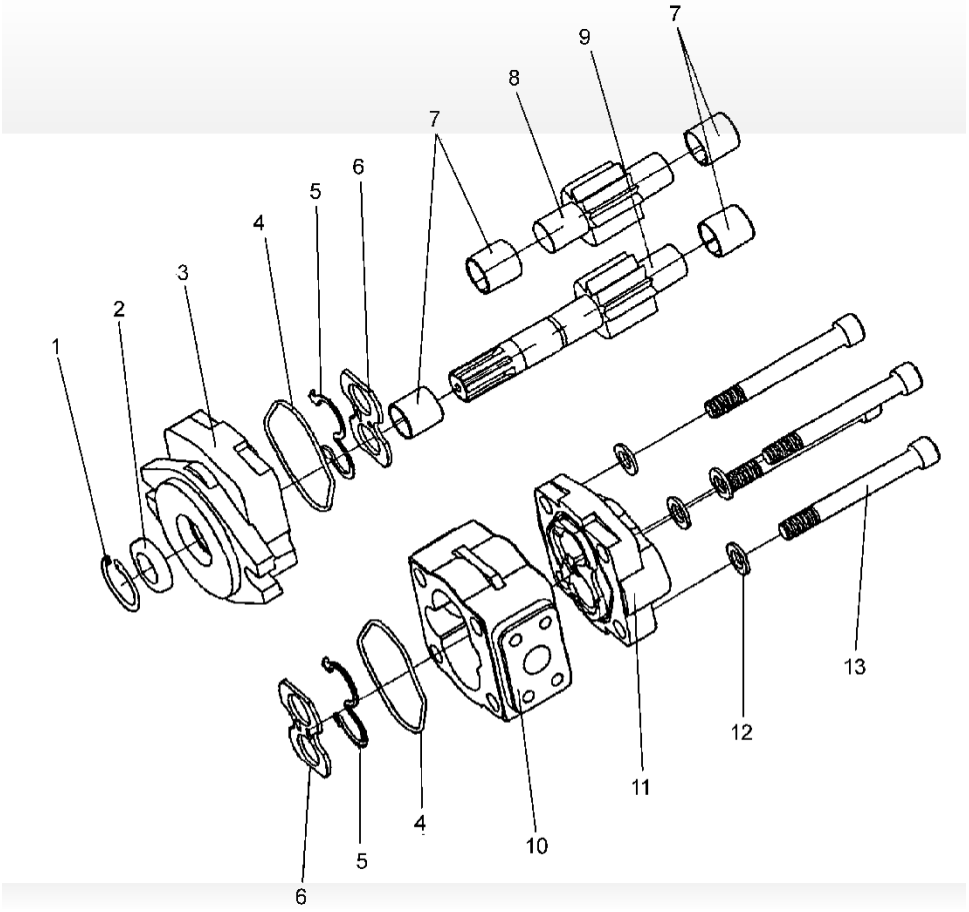


Figure 9-1CBHZ(G) or SGP1 rotate the gear pump counterclockwise (left)

1. Stop ring 2. Oil seal3. Front cover 4. Seal ring 5.3 Font seal ring
6. Side plate 7. Shaft sleeve 8. Passive gear9. Driving gear 10. Intermediate
11. Rear cover 12. Washers 13. Bolts

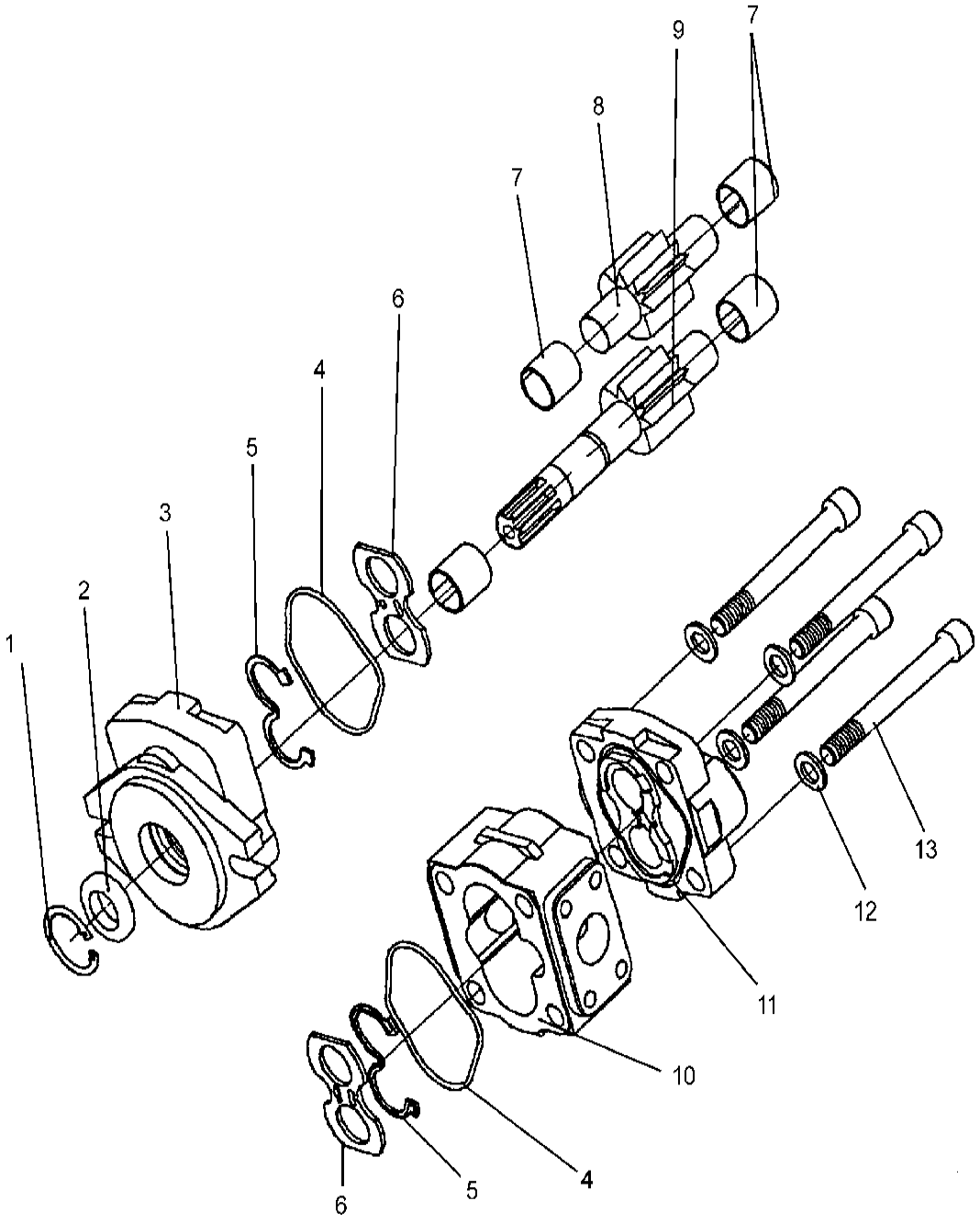


Figure 9-2CBHZ(G) or SGP1 Rotate the gear pump clockwise (right)

1. Stop ring 2. Oil seal3. Front cover 4. Seal ring 5.3 Font seal ring
6. Side plate 7. Shaft sleeve 8. Passive gear9. Driving gear 10. Intermediate
11. Rear cover 12. Washers 13. Bolts

3.2 CBT Main Oil Pump (1.0t-1.8t)

CPC10/15/18-AG26, CPCD10/15/18-AG26 main pump is a gear pump, mainly composed of pump body, pump cover, a pair of gear wheels, bearings and seals, the main oil pump uses load-balanced bearings and special lubrication methods, so that the gear end face to obtain the minimum clearance.

Because the pump body and the pump cover are made of aluminum alloy, light and strong, the two axes of the driving gear and the passive gear are respectively installed on the bearings of the pump body, these bearings are made of special materials, on the one hand to bear the radial load of the gear shaft, on the other hand as the gear end seat.

On one side of the drive shaft, the pump body is pressed with an oil seal to ensure sealing performance, and the seal between the pump body and the cover is guaranteed by a special shape sealing ring.

Remove it (see Figure 9-3).

a. After cleaning, gently clamp the pump to the clamp table, remove the bolt 12 first;

b. Remove pump cover 1 and seals 8, 9, 10 and 11;

c. Remove front end cover 7 and 8, 9, 10, 11;

d. Remove bearings 3, 4 and gear 5, 6 from pump body 2. If disassembly is difficult, the bearings can be removed by pressing the gear;

e. Figure 9-3 shows the sequence for easy check.

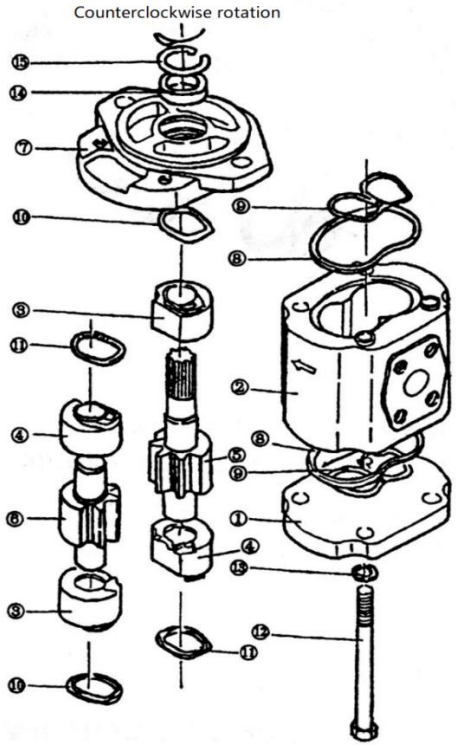


Figure 9-3 Rotating the gear pump counterclockwise
（CPC10/15/18-AG26、CPCD10/15/18-AG26）

1. End cover	2. Pump body	3. Bearing	4. Bearing	5. Driving gear
6. Passive gear	7. Front end cover	8. Sealing ring	9. Seal ring	10. Seal ring
11. Seal ring	12. Bolt	13. Lock washer	14. Oil seal	15. Lock ring

4．Multiway valve

The two-piece multiway valve is composed of four body pieces, two slide valves, a safety valve and a diverter valve. The four body pieces are assembled together by three stud bolts and nuts. The inclined slide valve is equipped with a inclined self-locking valve. According to the performance needs of the working device, the combined clamping valve and the rotary valve can be added.

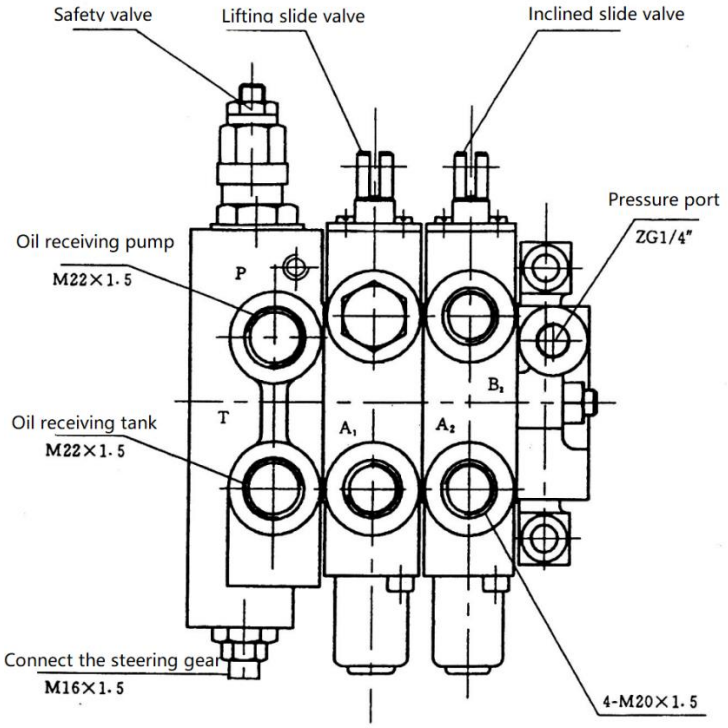


Figure 9-41.0t to 3.8t forklift multiway valves

4.1 Main safety valve and shunt safety valve

The main safety relief valve is composed of two parts: main valve A and pilot valve B. When the multi-way valve is reversed, the C chamber is connected with the high-pressure oil of the working mechanism (such as the lifting cylinder and the tilting cylinder). Pressure oil acts on pilot valve B through fixed throttle holes D and E. When the system pressure is greater than the system set pressure, pilot valve B opens, reducing the pressure of cavity F, and the whole main valve core A moves to the right, so that the pressure oil goes through the low pressure channel G and the cavity C is unloaded to ensure the stability of the system pressure. The adjusting screw H can be used to adjust the stable pressure value of the system.

The structure of the shunt safety valve is simple, it is a direct action overflow, and the stable pressure value of the steering system is obtained by using the principle that the liquid pressure is directly balanced with the spring force. When the steering disc is operated, the oil chamber M is connected to the high pressure oil circuit. When the system pressure is greater than the spring pressure, the spool N moves to the right, and the pressure oil passes through the T chamber to the low pressure, so that the M chamber is unloaded to ensure the stability of the steering system pressure. The adjusting screw K can be used to adjust the stable pressure value of the system.

L valve is a balanced slide valve. Through the constant change of flow rate and pressure, the slide valve L moves left and right without changing the opening of R and S, so as to ensure the automatic balance of the flow to the working chamber Q and outlet PF to the full hydraulic steering gear, and the proportional and stable shunt; a, b, and c are fixed throttle holes.

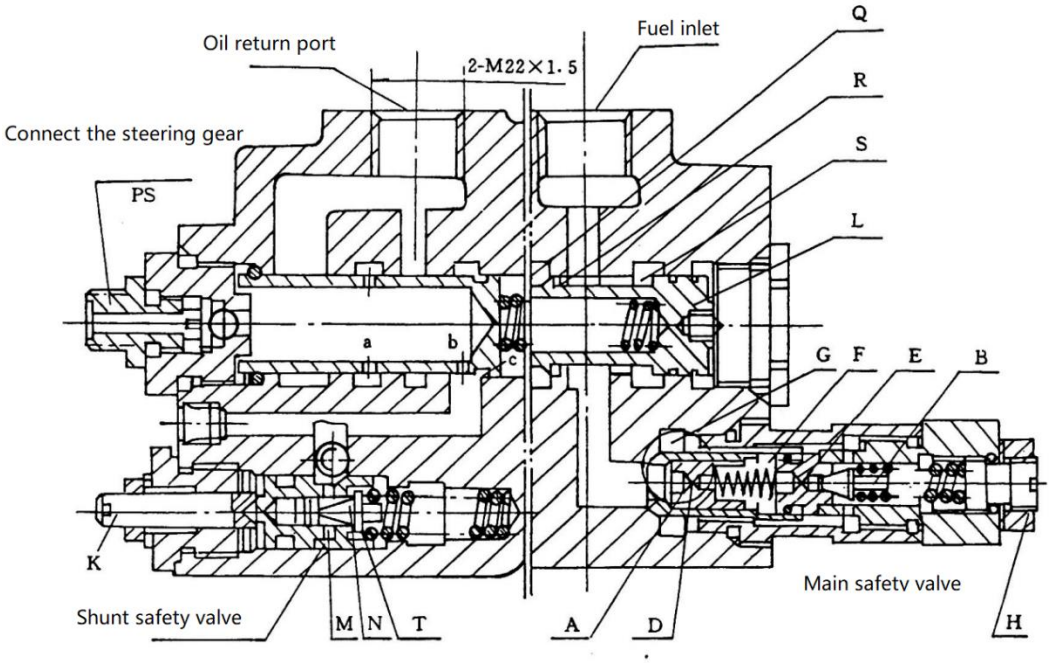
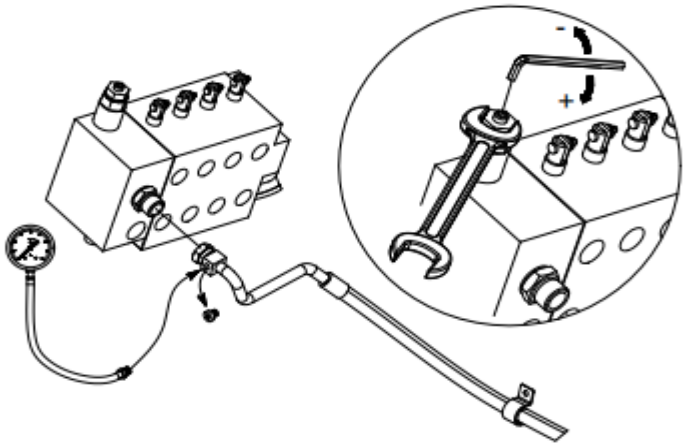


Figure 9-5

4.2 Main safety valve pressure adjustment before leaving the factory the main safety valve pressure has been adjusted, under normal circumstances, do not allow users to adjust. The adjustment method is as follows:

(1) The vehicle is parked on a solid and flat road, in neutral, pull the overhand brake handle, tilt the door frame back to the end, and the cargo fork is lowered to the ground. The engine is dead.

(2) Open the front floor, loosen the bolt at the pressure measuring port of the multiway valve oil inlet pipe, and place it in a clean place. There is hydraulic oil flow, pay attention to protect the environment.



(3) Connect the pressure gauge. Note: ① The specifications of the table are greater than 20MPa.

② Pressure measuring port taper thread fit: Rc1/8R1/8; c.

The tightening torque is 20-22N·m

(4) Start the engine, the door frame is vertical, and the fork is 300mm off the ground.

(5) Read the reading of the pressure gauge to determine whether the pressure of the main safety valve of the multiway valve is in the normal range.

1.0t: 13MPa, 1.5t: 15MPa, 1.8t: 18.5MPa, 2.0t~X4t: 18.5MPa±0.25MPa

(6) If the pressure of the main safety valve of the multi-way valve is not in the normal range, the lock nut of the main safety valve should be loosened and the adjusting screw should be adjusted. Reading less than the normal range: clockwise (+) turn the adjusting screw to increase the pressure of the main safety valve. If the reading is greater than the normal range, the adjusting screw should be rotated counterclockwise (-) to reduce the pressure of the main safety valve.

(7) Keep the pressure stable in the normal range for 30 seconds.

(8) Loosen the pressure gauge, reinstall the bolt, and tighten the torque 20-22N.m. The gantry drops to the ground and leans back to the bottom.

(9) Re-lock the locking nut and reinstall the front bottom plate.

4.3 Tilt self-locking valve

The tilt slide valve is equipped with a self-locking valve, which is mainly used to prevent vibration caused by the negative pressure inside the tilt cylinder and avoid false operation

In the general traditional structure, the inclined slide valve can also be operated to tilt forward after the engine is turned off. However, with this inclined self-locking valve, even if the control valve stem is pushed vigorously, the door frame cannot tilt forward when the engine is turned off. The structure is shown in Figure 9-6.

The interface of the valve body: port A and port B are respectively connected to the front and back cavities of the inclined cylinder piston, and when the slide valve is pulled out, the high-pressure oil (P) enters the interface

A, the oil in the rear chamber is returned to the tank (T) by B, and the gantry is in a backward state. When pushing the inclined slide valve, the high pressure oil enters the interface B, with the help of high pressure oil to make the self-locking valve action in the slide valve, A is connected to the low pressure, when the engine stalls or stops, there is no high pressure oil to make the self-locking valve action in the slide valve, so the interface A can not pass the low pressure, the door frame will not tilt forward, and the negative pressure can not be formed in the inclined cylinder.

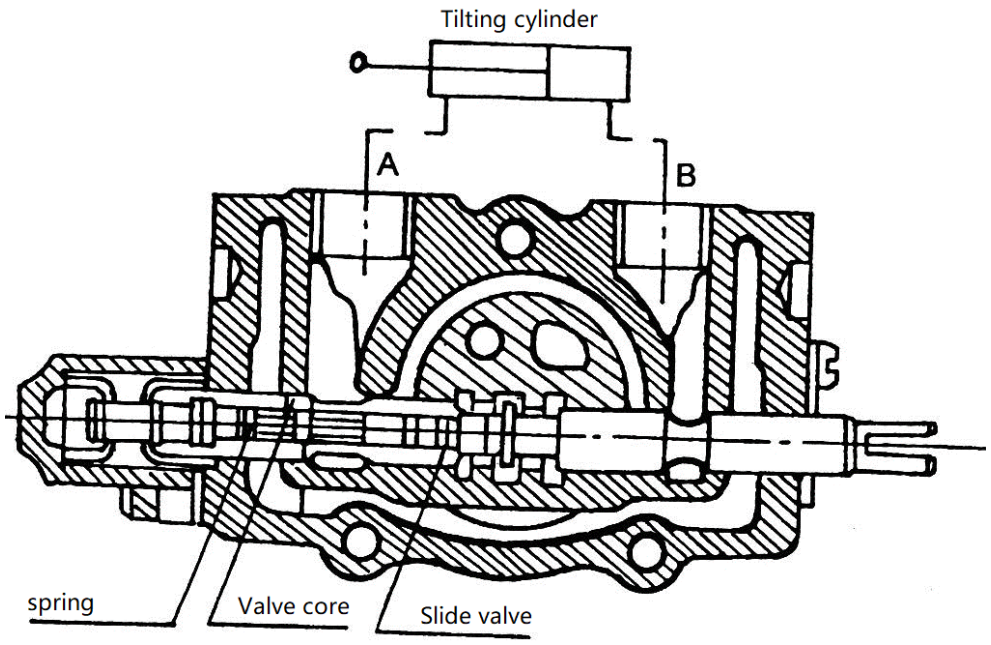


Figure 9-6

5．Hydraulic system oil circuit

the high pressure oil from the main oil pump reaches the multi-way valve, which is divided into two parts by the multi-way valve and through the diverter valve: one part is to distribute the high pressure oil to the lifting cylinder or tilt cylinder, and the other part is to control the steering cylinder with a constant flow to the steering cylinder, when the lifting and tilt two slide valves are in a neutral position, the high pressure oil directly returns to the tank from the channel; When the lifting slide valve is pulled, the high pressure oil passes through the throttle valve, and then pushes the piston rod upward under the lifting cylinder piston. When the lifting slide valve is pushed, the lower part of the lifting cylinder piston is communicated with the low pressure, and the piston rod is lowered by the dead weight and the cargo weight. At this time, the oil flowing from the lifting cylinder passes through the one-way speed limiting valve to control the falling speed. When the tilting slide valve is operated, the high pressure oil can flow into the front chamber of the tilting cylinder, and the other side is communicated with the low pressure to make the door frame complete the backward or forward tilt action.

The lower part of the right lifting cylinder is equipped with a cut-off valve, whose function is to prevent the sudden drop of goods when the oil pipe bursts.

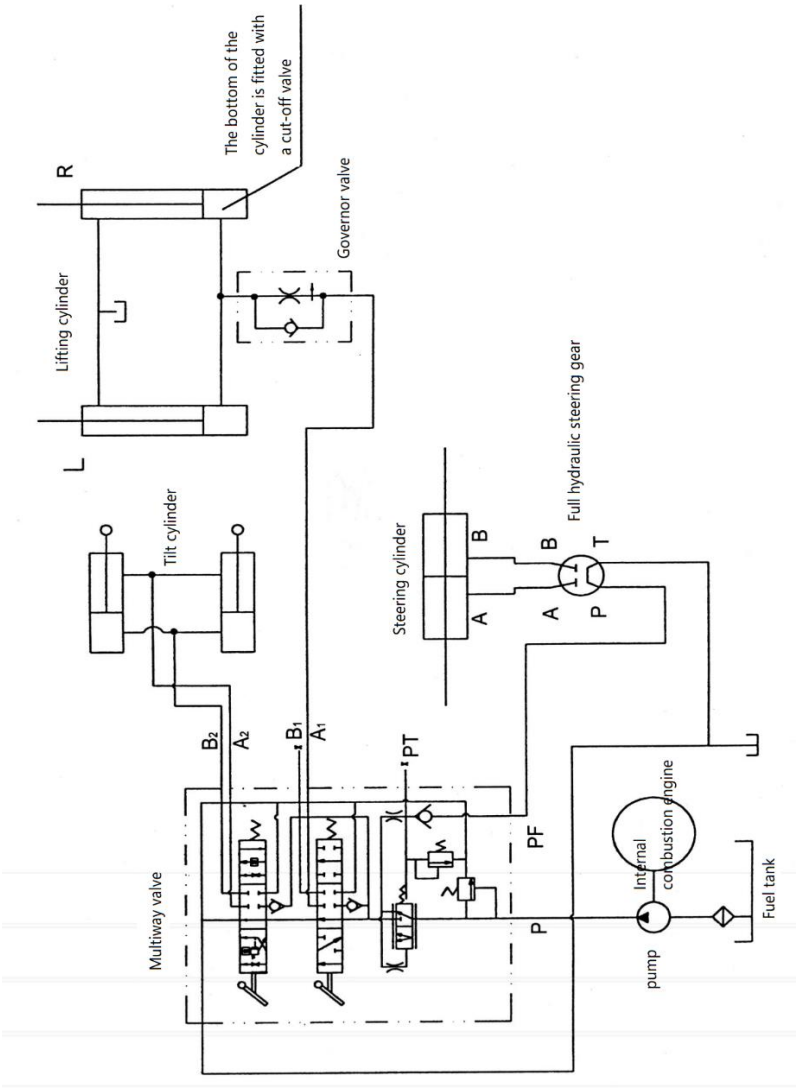


Figure 9-7 Schematic diagram of the hydraulic system

XV、Lifting system

1．Assembly and debugging data

Gantry class		Standard type and raised	Elevation > 4 ~ 5 m	Elevation > 5 ~ 6 meters
Gantry Angle	anteversion	6°	6°	3°
	retroversion	12°	6°	6°
Fork roller		Combined rollers and side rollers are used		

Check and adjust

Detection position	Assembly gap（mm）	Repair (without replacing parts) clearance（mm）
Between the frame and the	0.1～0.8	0.2～1
Gasket mm	0.5,1.0,2.0	
Between the frame and the supporting guide plate	0.1～0.8	0.2～1
Gasket mm	0.5,1.0,2.0	
Between the inner door frame and the side roller of the fork	0.1～0.6	0.2～1
Gasket mm	0.5,1.0,1.5	
Lift chain sag mm	25～30	

Tightening torque of main parts

position	Forklift model or load	N·M
Lifting chain lock nut	1～1.8 T	127-157（M16），245-314（M20 Single link）
	2～3.8 T	176-216(M18) 245-314（M20）
Bearing covers for the door frame and drive axle	1～1.8 T	89-118（M14）
	2～3.8 T	176-216（M18）
Tilt cylinder lock nut	1～1.8 T	89-118（M14）
	2～3.8 T	
Lift cylinder bolt	1～3.8 T	76-107（M12）
Lift cylinder bolt	1～1.8 T	22-29（M8）
	2～3.8 T	44-58（M10）
Lifting cylinder retaining bolt(U-bolt)	1～1.8 T	14-18（M8）
	2～3.8 T	29-39（M10）

Gantry type	Gantry type	Maximum lifting height	Gantry height			Payload capacity	
			Landing height of the gantry	Gantry protruding height		NO Load-backrest	Load-backrest
				NO Load-backrest	Load-backrest		
		mm	mm	mm	mm	mm	mm
		mm	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t
Secondary wide view gantry	A20/25/M200	2000	1615	2635	3045	140	140
	A20/25/M250	2500	1745	3135	3545	140	140
	A20/25/M270	2700	1845	3335	3745	140	140
	A20/25/M300	3000	1995	3635	4045	140	140
	A20/25/M330	3300	2145	3935	4345	140	140
	A20/25/M350	3500	2245	4135	4545	140	140
	A20/25/M360	3600	2345	4235	4645	140	140
	A20/25/M370	3700	2395	4335	4745	140	140
	A20/25/M380	3800	2445	4435	4845	140	140
	A20/25/M400	4000	2595	4635	5045	140	140
	A20/25/M430	4300	2745	4935	5345	140	140
	A20/25/M450	4500	2845	5135	5545	140	140
	A20/25/M480	4800	2995	5435	5845	140	140
	A20/25/M500	5000	3095	5635	6045	140	140
	A20/25/M550	5500	3345	6135	6545	140	140
	A20/25/M600	6000	3595	6635	7045	140	140

Gantry type	Gantry type	Front overhang	Mast tilt angle	Payload capacity			
				500mm Load center distance			
				Single round		Double wheel	
		mm	Front/ rear	2.0t	2.5t	2.0t	2.5t
		2.0t/2.5t	(°)	kg	kg	kg	kg
Secondary wide view gantry	A20/25/M200	465	6/12	2000	2500	2000	2500
	A20/25/M250	465	6/12	2000	2500	2000	2500
	A20/25/M270	465	6/12	2000	2500	2000	2500
	A20/25/M300	465	6/12	2000	2500	2000	2500
	A20/25/M330	465	6/12	2000	2500	2000	2500
	A20/25/M350	465	6/12	2000	2500	2000	2500
	A20/25/M360	465	6/12	2000	2500	2000	2500
	A20/25/M370	465	6/12	2000	2500	2000	2500
	A20/25/M380	465	6/12	2000	2500	2000	2500
	A20/25/M400	465	6/12	1900	2300	2000	2500
	A20/25/M430	465	6/6 *6/12	1800	2100	1950	2450
	A20/25/M450	465	6/6 *6/12	1700	2000	1900	2400
	A20/25/M480	465	6/6 *6/12	1500	1700	1700	2100
	A20/25/M500	465	6/6 *6/12	1400	1600	1600	2000
	A20/25/M550	465	3/6 *3/6	1300	1400	1500	1800
	A20/25/M600	465	3/6 *3/6	1000	1050	1400	1600

Gantry type	Gantry type	Maximum lifting height	Gantry height			Free lifting height	
			Landing height of the gantry	Gantry protruding height		NO Load-backrest	Load-backrest
				NO Load-backrest	Load-backrest		
		mm	mm	mm	mm	mm	mm
		mm	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t	2.0t/2.5t
Two level full free lift gantry	A20/25/U250	2500	1810	3170	3545	1140	760
	A20/25/U270	2700	1910	3370	3745	1240	860
	A20/25/U300	3000	2010	3670	4045	1340	960
	A20/25/U330	3300	2160	3970	4345	1490	1110
	A20/25/U360	3600	2310	4270	4645	1640	1260
	A20/25/U400	4000	2560	4670	5045	1890	1510
Three full free lift gantry	A20/25/N400	4000	1955	4695	5055	1270	910
	A20/25/N430	4300	2055	4995	5355	1370	1010
	A20/25/N450	4500	2125	5245	5605	1440	1080
	A20/25/N480	4800	2225	5495	5855	1540	1180
	A20/25/N500	5000	2290	5695	6055	1605	1245
	A20/25/N550	5500	2455	6195	6555	1770	1410
	A20/25/N600	6000	2675	6705	7055	1990	1630
	A20/25/N650	6500	2850	7195	7555	2165	1805
	A20/25/N700	7000	3055	7725	8055	2340	2010

Gantry type	Gantry type	Front overhang	Mast tilt angle	Payload capacity			
				500mm Load center distance			
				Single tire		Double tire	
		mm	Front/ rear	2.0t	2.5t	2.0t	2.5t
		2.0t/2.5t	(°)	kg	kg	kg	kg
Two level full free lift gantry	A20/25/U250	465	6/12	2000	2500	2000	2500
	A20/25/U270	465	6/12	2000	2500	2000	2500
	A20/25/U300	465	6/12	2000	2500	2000	2500
	A20/25/U330	465	6/12	2000	2500	2000	2500
	A20/25/U360	465	6/12	2000	2500	2000	2500
	A20/25/U400	465	6/12	1900	2300	2000	2500
Three full free lift gantry	A20/25/N400	475	6/6	1800	2100	1950	2450
	A20/25/N430	475	6/6	1700	2000	1900	2400
	A20/25/N450	475	6/6	1600	1900	1800	2300
	A20/25/N480	475	6/6	1500	1700	1700	2100
	A20/25/N500	475	6/6	1400	1600	1600	2000
	A20/25/N550	475	3/6	1050	1200	1500	1800
	A20/25/N600	475	3/6	700	800	1400	1600
	A20/25/N650	475	3/6	\	\	1300	1450
	A20/25/N700	475	3/6	\	\	1200	1300

100kg less with integral side shifter, 150kg less with external side shifter.

* Optional tilt Angle for dual wheels.

2-2.5t models can choose three levels 7.5 meters, 8 meters door frame.

Gantry type	Gantry type	Maximum lifting height	Gantry height						Free lifting height			
			Landing height of the gantry		Gantry protruding height				Free rack		Shelf with standard stop	
					Free rack		Shelf with standard stop					
			mm		mm		mm		mm		mm	
		mm	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t
Secondary wide view gantry	A30/35/M200	2000	1555	1670	2670	2790	3105	3105	145	150	145	150
	A30/35/M250	2500	1805	1920	3170	3290	3605	3605	145	150	145	150
	A30/35/M270	2700	1905	2020	3370	3490	3805	3805	145	150	145	150
	A30/35/M300	3000	2055	2170	3670	3790	4105	4105	145	150	145	150
	A30/35/M330	3300	2205	2320	3970	4090	4405	4405	145	150	145	150
	A30/35/M350	3500	2305	2420	4170	4290	4605	4605	145	150	145	150
	A30/35/M360	3600	2405	2470	4270	4390	4705	4705	145	150	145	150
	A30/35/M370	3700	2455	2520	4370	4490	4805	4805	145	150	145	150
	A30/35/M380	3800	2505	2570	4470	4590	4905	4905	145	150	145	150
	A30/35/M400	4000	2655	2720	4670	4790	5105	5105	145	150	145	150
	A30/35/M430	4300	2805	2870	4970	5090	5405	5405	145	150	145	150
	A30/35/M450	4500	2905	2970	5170	5290	5605	5605	145	150	145	150
	A30/35/M480	4800	3055	3120	5470	5590	5905	5905	145	150	145	150
	A30/35/M500	5000	3155	3220	5670	5790	6105	6105	145	150	145	150
	A30/35/M550	5500	3405	3470	6170	6290	6605	6605	145	150	145	150
	A30/35/M600	6000	3655	3720	6670	6790	7105	7105	145	150	145	150

Gantry type	Gantry type	Front overhang		Gantry Angle	Lifting capacity					
					500mm Load center distance					
					Single round			Double wheel		
		mm		Front/ rear	3.0t	3.5t	3.8t	3.0t	3.5t	3.8t
		3.0t	3.5t/3.8t	(°)	kg	kg	kg	kg	kg	kg
Secondary wide view gantry	N30/35/M200	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M250	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M270	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M300	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M330	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M350	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M360	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M370	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M380	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M400	480	485	6/12	3000	3500	3800	3000	3500	3800
	N30/35/M430	480	485	6/6 *6/12	2900	3250	3650	3000	3400	3800
	N30/35/M450	480	485	6/6 *6/12	2850	3100	3350	3000	3350	3700
	N30/35/M480	480	485	6/6 *6/12	2700	2900	3100	2900	3050	3450
	N30/35/M500	480	485	6/6 *6/12	2550	2800	2850	2850	2850	3200
	N30/35/M550	480	485	3/6 *3/6	2250	2350	2650	2650	2700	3000
	N30/35/M600	480	485	3/6 *3/6	1550	1750	2200	2200	2400	2800

Gantry type	Gantry type	Maximum lifting height	Gantry height						Free lifting height			
			Landing height of the gantry		Gantry protruding height				NO Load-backrest		Load-backrest	
					NO Load-backrest		Load-backrest					
			mm		mm		mm		mm		mm	
		mm	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t	3.0t	3.5t/3.8t
Two level full free lift gantry	A30/35/U250	2500	1880	1990	3260	3355	3620	3620	1120	1140	735	845
	A30/35/U270	2700	1980	2090	3460	3555	3820	3820	1220	1240	835	945
	A30/35/U300	3000	2090	2190	3770	3845	4120	4120	1330	1340	945	1045
	A30/35/U330	3300	2240	2390	4070	4155	4420	4420	1480	1540	1095	1245
	A30/35/U360	3600	2390	2550	4370	4455	4720	4720	1630	1700	1245	1405
	A30/35/U400	4000	2590	2750	4770	4855	5120	5120	1830	1900	1445	1605
Three full free lift gantry	A30/35/N400	4000	2005	2105	4780	4855	5120	5120	1235	1260	860	960
	A30/35/N430	4300	2105	2205	5080	5155	5420	5420	1335	1360	960	1060
	A30/35/N450	4500	2175	2175	5335	5355	5670	5670	1405	1430	1030	1130
	A30/35/N480	4800	2275	2375	5580	5655	5920	5920	1505	1530	1130	1230
	A30/35/N500	5000	2340	2440	5780	5855	6120	6120	1570	1595	1195	1295
	A30/35/N550	5500	2505	2605	6280	6355	6620	6620	1735	1760	1360	1460
	A30/35/N600	6000	2725	2770	6780	6855	7120	7120	1955	1925	1580	1625
	A30/35/N650	6500	2900	3000	7280	7355	7615	7615	2130	2155	1755	1850
	A30/35/N700	7000	3105	3170	7780	7855	8115	8115	2335	2325	1960	2125

Gantry type	Gantry type	Front overhang		Mast tilt angle	Payload capacity					
					500mm Load center distance					
					Single tire			Double tire		
		mm		Front/ rear	3.0t	3.5t	3.8t	3.0t	3.5t	3.8t
		3.0t	3.5t/3.8t	(°)	kg	kg	kg	kg	kg	kg
Two level full free lift gantry	A30/35/U250	480	485	6/12	3000	3500	3800	3000	3500	3800
	A30/35/U270	480	485	6/12	3000	3500	3800	3000	3500	3800
	A30/35/U300	480	485	6/12	3000	3500	3800	3000	3500	3800
	A30/35/U330	480	485	6/12	3000	3500	3800	3000	3500	3800
	A30/35/U360	480	485	6/12	3000	3500	3700	3000	3500	3700
	A30/35/U400	480	485	6/12	2850	3250	3550	3000	3500	3700
Three full free lift gantry	A30/35/N400	490	505	6/6	2700	3000	3200	2900	3400	3600
	A30/35/N430	490	505	6/6	2550	2850	3200	2850	3350	3600
	A30/35/N450	490	505	6/6	2400	2700	3100	2700	3200	3550
	A30/35/N480	490	505	6/6	2250	2450	2800	2550	2950	3150
	A30/35/N500	490	505	6/6	2100	2300	2600	2400	2800	3100
	A30/35/N550	490	505	3/6	1650	1800	2050	2250	2550	2800
	A30/35/N600	490	505	3/6	1200	1300	1550	2100	2300	2550
	A30/35/N650	490	505	3/6	\	\	\	1950	2050	2300
	A30/35/N700	490	505	3/6	\	\	\	1800	1850	2050

100kg less with integral side shifter, 200kg less with external side shifter.

* Optional tilt Angle for dual wheels.

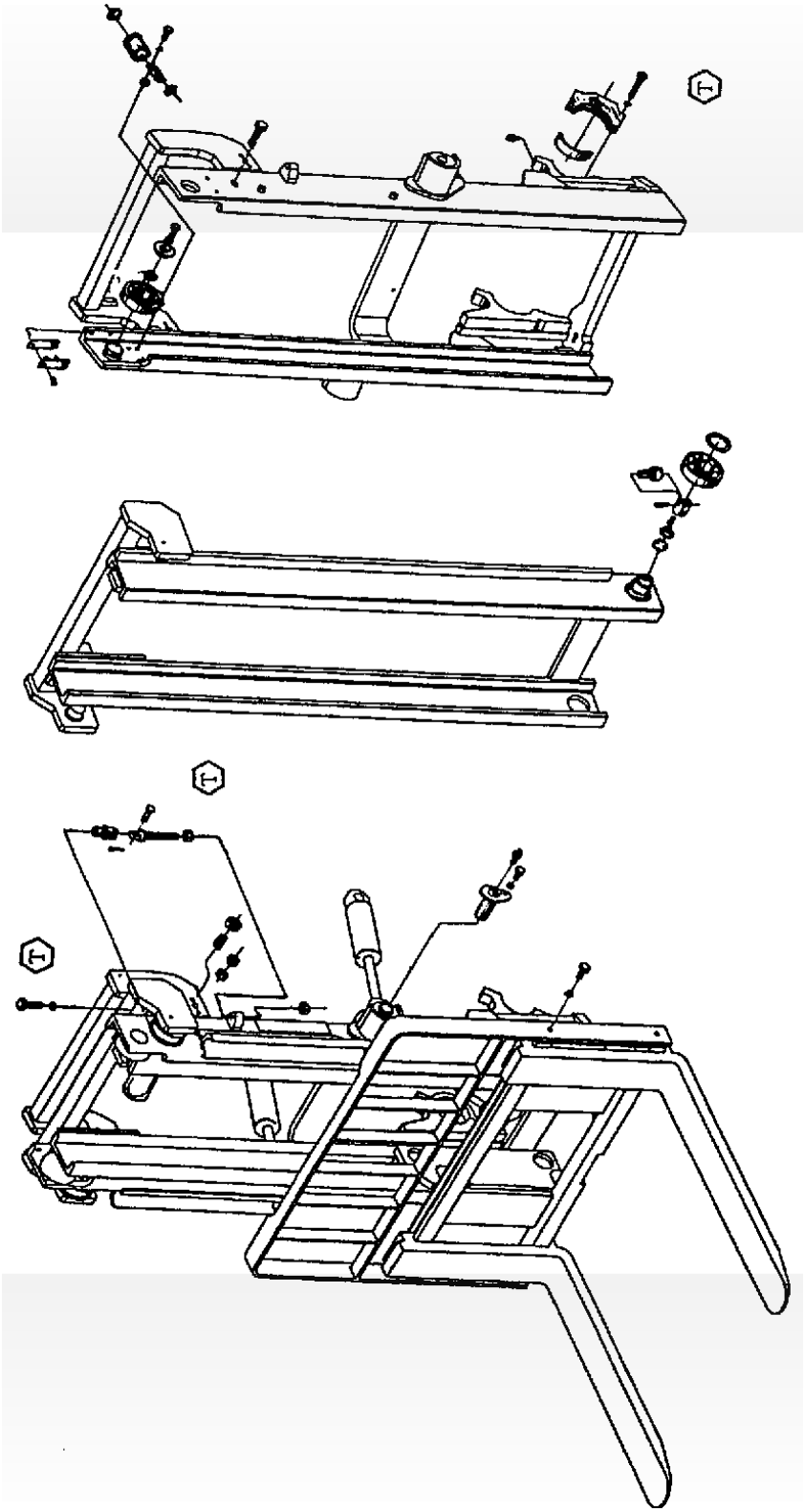
3-3.8t models can choose three levels 7.5 meters, 8 meters door frame.

Frame size parameters

		CPC(D)20-AX1	CPC(D)25-AX1	CPC(D)30-N1X1	CPC(D)35-N1X1	CPC(D)38-N1X1
Gantry/fork tilt Angle, forward/back tilt	α/β(°)	6/12	6/12	6/12	6/12	6/12
Gantry retracting height	h1(mm)	1995	1995	2055	2170	2170
Free lifting height	h2(mm)	140	140	145	150	150
Lifting height	h3(mm)	3000	3000	3000	3000	3000
Lifting height (including fork thickness)	h23(mm)	3040	3040	3045	3050	3050
Gantry development height	h4(mm)	4025	4025	4105	4105	4105
Top guard height	h6(mm)	2130	2130	2150	2150	2150
Seat height	h7(mm)	1030	1030	1050	1050	1050
Traction pin height	h10(mm)	400	400	420	420	420
Overall length	l1(mm)	3698	3698	3870	3945	3945
Body length (without fork)	l2(mm)	2628	2628	2775	2835	2875
Total width (frame/tires)	b1(mm)	1150/1163	1150/1163	1195/1228	1195/1228	1195/1228
Fork size	s/e/l(mm)	1070/120/40	1070/120/40	1070/122/45	1070/122/50	1070/122/50
Fork mounting grade		3A	3A	3A	3A	3A
Width of fork rack	b3(mm)	1040	1040	1100	1100	1100
Ground clearance under gantry	m1(mm)	120	120	140	140	140
Wheelbase center ground clearance	m2(mm)	170	170	190	190	190
Working channel width,1000X1200 pallets (1200 cross-fork placement)	Ast(mm)	3935	3935	4130	4195	4225
Working channel width,800X1200 pallets (1200 placed along the fork)	Ast(mm)	4135	4135	4330	4395	4425
Turning radius	Wa(mm)	2270	2270	2450	2510	2540
Inside turning radius	b13(mm)	615	615	715	715	715

2．Fault diagnosis and troubleshooting methods

breakdown	Possible cause	Elimination method
Fork frame and door frame tilt by	1. Excessive wear of tilting cylinder and seal ring.	Replace piston seal or cylinder
	2. Multiway valve control stem spring failure.	Switch
Fork lift tilt is not flexible	1. Piston stuck cylinder wall or piston rod bent.	Replace damaged parts
	2. Excessive fouling in the tank.	Cleanse
The fork lift is not smooth	1. Improper adjustment of fork rack assembly.	Adjust the clearance between channel guide rail and side roller
	2. The clearance between the roller and the frame channel is insufficient.	Adjust the roller clearance
	3. There's dirt stuck between moving parts.	Removal of foreign body
	4. Insufficient lubrication.	Smear the contact surface of the sliding guide rail
	5. The inner door frame is skewed or the fork frame is bent.	Grease (butter)
The fork does not lift evenly	1. The lifting chain is not properly adjusted.	Adjust the chain tightness on both sides to be consistent
The lifting roller does not rotate	1. Grease (butter) hardens, or rollers are stuck with dirt.	Clean and lubricate rollers
	2. The lifting roller is not adjusted correctly.	adjust
Excessive noise from the gantry	1. Insufficient lubrication.	oiling
	2. The upper side roller of the fork frame is not evenly adjusted, and when the door frame is extended, it will fall and hit the door frame channel steel.	Adjusting roller, side rolling adjusting gasket
Lifting inability or inability to lift	1. Oil pump gear and pump body wear too much, the gap is too large.	Replace worn parts or oil pumps
	2. Lifting cylinder piston seal ring wear, internal leakage.	Replace the new Y-ring seal
	3. Multi-way valve, safety valve spring failure.	Replace spring
	4. Multiway valve control rod and valve body wear excessive oil leakage.	switch
	5. There is a leak between the multiple valve bodies.	After grinding, reassemble and tighten the screws in sequence
	6. Hydraulic line leaks.	Press the joint nut and check the
	7. The hydraulic oil temperature is too high, the hydraulic oil is too thin, and the flow rate is not enough.	Whether the pad and coupling nut are damaged
	8．The load is too heavy.	Regular lifting



T- Tighten torque. Check the previous table

3 . summarize

The lifting system of forklift truck is composed of portal frame, fork frame, fork, stop shelf, lifting chain, roller, lifting cylinder and tilting cylinder, etc. It and the oil circuit and hydraulic system constitute the working device of forklift truck, which is the executive mechanism of forklift truck loading and unloading operation. Generally classified according to the type of door frame structure, the ordinary door frame has a single level, two levels, three levels. The forklift produced by our company is equipped with a two-stage wide-field frame; Two-stage fully free lifting gantry (including container gantry); Three classes of full free lifting gantry; The door frame structure is CL type and row rolling type.

3.1 Two-stage wide-field frame

The two-stage wide-field frame is composed of an outer frame that cannot be lifted and an inner frame that can be moved up and down. Go up and down The bottom of the cylinder is fixed on the lower cross member of the outer door frame and is positioned by a pin. The end of the piston rod is connected with the upper cross member assembly of the inner door frame. The cylinder is fixed on the left and right vertical plates of the cross member of the outer door frame by U-shaped bolts. The general free lifting range of 100~130 mm varies depending on the tonnage. The rear two lifting cylinders (Figure 10-5 is the right lifting cylinder) are positioned behind the door frame to achieve a wide field of view.

The fork is hung on the fork rack through the hook, and the fork rack is equipped with a roller, a combination roller (that is, the side roller is set in the middle of the side of the roller) and a side roller (only the combination roller is used for 1-1.8 tons of small tonnage forklift trucks). The lower end of the inner door frame is equipped with a combination roller.

The pressure oil from the multi-way valve enters the lifting oil cylinder through the speed limiting valve, pushes the piston and piston rod to rise, thereby driving the inner door frame to rise, and at the same time, one end of the chain on the sprocket installed in the inner door frame is fixed on the outer door frame, and one end is connected with the fork frame. With the inner door frame Lift and pull the fork frame, and lift the fork to achieve the purpose of lifting the goods. The R series gantry chain is designed to be external. Our company to lift 3 meters high forklift as the basic form of supply. Other lifting heights (2.5 m to 4.5 m, more than 3 tons can be extended to 5 m) for special orders.

3.2 Two-stage fully free lifting door frame (including container forklift door frame)

The two-stage fully free lifting gantry (as shown in Figure 10-2) is also composed of an inner gantry, an outer gantry, and a cargo fork rack. Different from the ordinary standard type, the rear two left and right lifting cylinders are plunger type cylinders. They are slightly different in structure, in which one of the piston rods is hollow and acts as a channel for the oil to enter the front cylinder. The upper end of the piston rod of the two left and right lifting cylinders is connected with the end support of the inner gantry. In addition, the middle of the inner door frame is equipped with a short lifting cylinder called a free lifting cylinder.

Because the inner door frame does not extend when the free lifting cylinder is lifted, the fork can operate at >1400 mm. This height has 2.5 meters, 2.7 meters, 3 meters, 3.3 meters, 4 meters and other different specifications, the free lift is generally 1300 mm to 2100 mm.

When the minimum height of the gantry is ≥2200 mm, the lifting height is 3 meters, and the full free lifting is about 1500 mm, the gantry equipped with the side shifting device of the cargo fork is called the gantry of the container forklift truck (see Figure 10-3). The side-shifting oil cylinder of

the container forklift truck can be used to reach the correct position only when the goods do not reach the ideal position during stacking, and the rest should be restored to the median position. The above two door frame configurations have the same free lift cylinder structure. There are two kinds of cylinder structure:

1) See Figure 10-7 and Figure 10-8 for the structure of a forklift truck with more than 3 tons.

2) See Figure 10-9 and Figure 10-10 for the structure of a forklift truck less than 2.5 tons.

3.3 Three level full free lifting frame

The three-stage full free lifting gantry (Figure 10-4) is composed of an outer gantry, a middle gantry and an inner gantry. The middle gantry and the inner gantry can be retractable. The height of this series is 4.3 meters, 4.5 meters, 4.8 meters, 5 meters, 5.5 meters, 6 meters and other different specifications. It is different from the two-stage full free gantry mainly in that there is more than one middle gantry, and the two rear left and right lifting cylinders are piston cylinders (Figure 10-5) and the oil circuit system is more complex. The free lifting cylinder structure is shown in Figure 10-6.

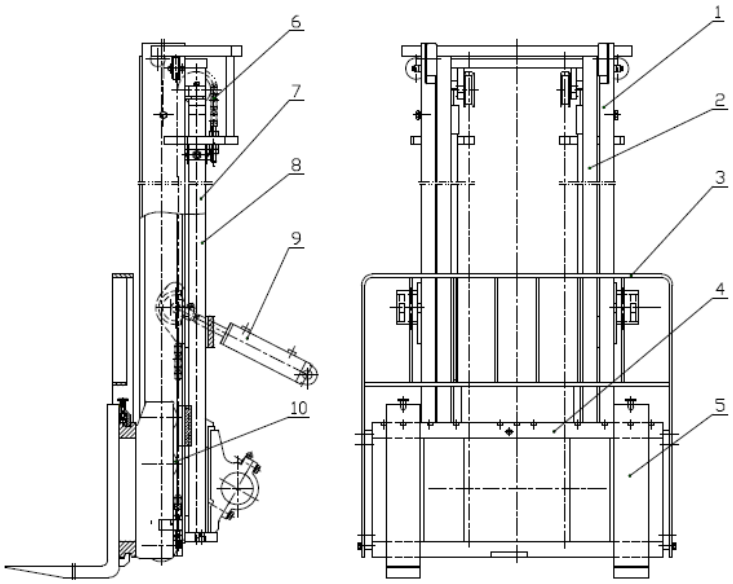


Figure 10-1 Two-level wide-field gantry

1. Outer door frame 2. Inner door frame 3. Stop shelf 4. Fork frame 5. Fork
6. Chain 7. Left lift cylinder 8. Right lift cylinder 9. Tilt cylinder 10. roller

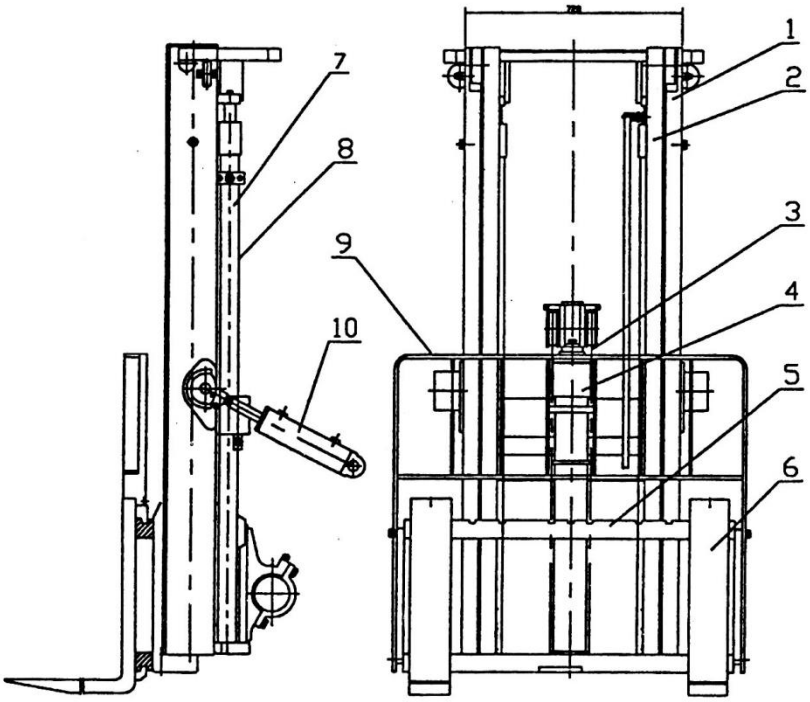


Figure 10-2 Two-stage full-free lifting door frame

1. Outer door frame 2. Inner door frame 3. Chain 4. Free lifting cylinder 5. Cargo fork frame
6. Fork 7. Left lift cylinder 8. Right lift cylinder 9. Stop shelf 10. Tilt cylinder

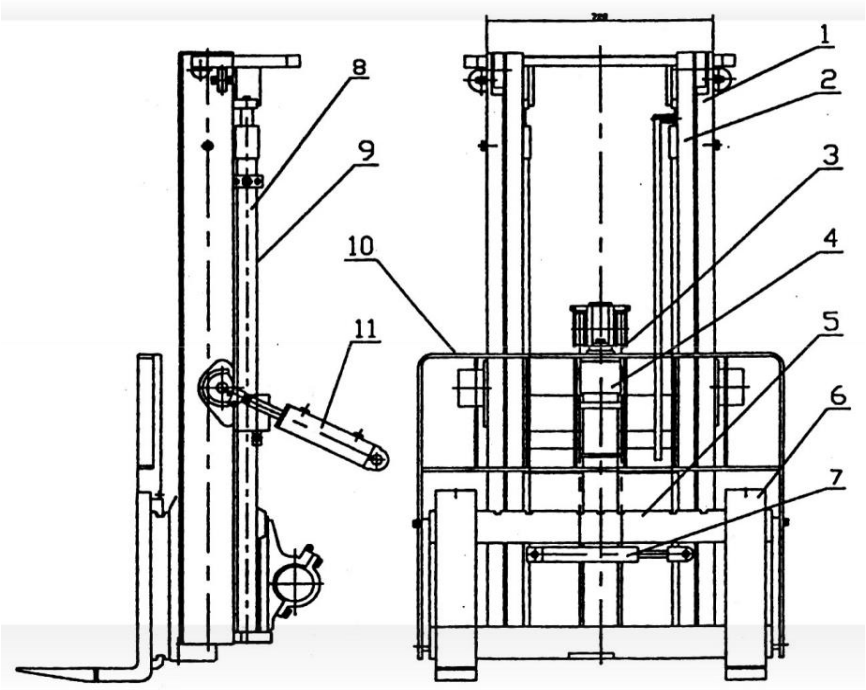


Figure 10-3 Door frame of a container forklift truck

1. Outer door frame 2. Inner door frame 3. Chain 4. Free lifting cylinder 5. Cargo fork frame 6. Fork 7. Side shift cylinder 8. Left lift cylinder 9. Right lift cylinder 10. Stop shelf 11. Tilt cylinder

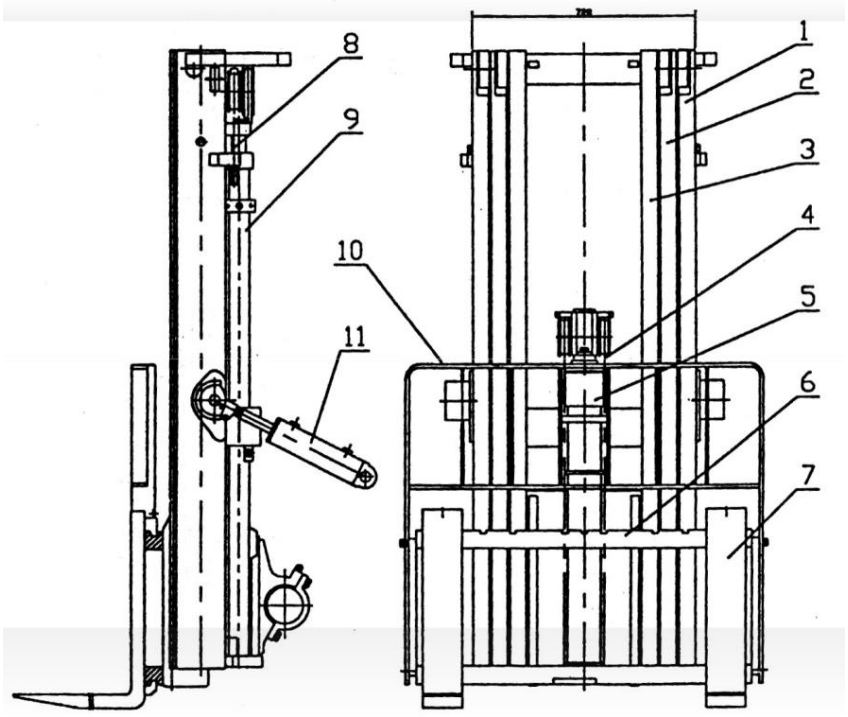


Figure 10-4 Three-stage full-free lifting portal

1. Outer frame 2. Middle frame 3. Inner frame 4. Front cylinder chain 5. Free lifting cylinder 6. Cargo fork frame 7. Fork 8. Chain 9. Left lift cylinder 10. Right lift cylinder 11. Stop shelf 12. Tilt cylinder

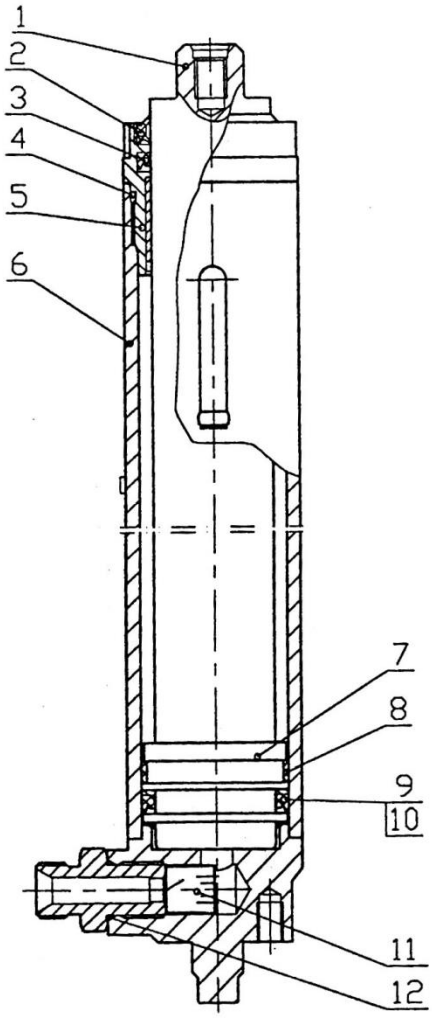


Figure 10-5 Lifting and lowering the cylinder (Figure 10-1,10-4)

1. Piston 2. Dust ring 3. Sealing ring
4. O-type sealing ring 5. Guide sleeve
6. Cylinder body 7. Piston 8. Supporting ring
9. Protective ring 10. Sealing ring
11. Oil nozzle assembly (left lifting cylinder without)12. O-type sealing ring

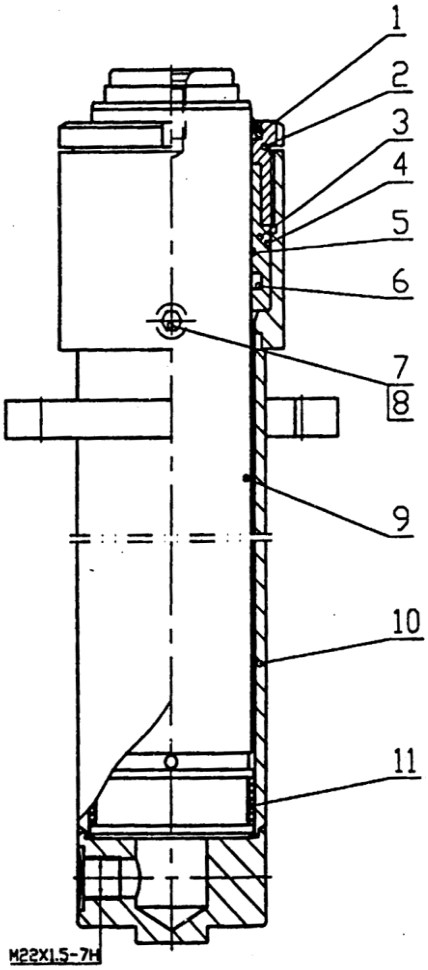


Figure 10-6 Lifting the cylinder freely (Figure 10-4)

1. Dust ring 2. Cylinder head 3. Guide sleeve
4. O-ring 5. O-ring
6. Sealing ring 7. O-ring 8. Bleed plug
9. Piston rod 10. Cylinder 11. Support ring

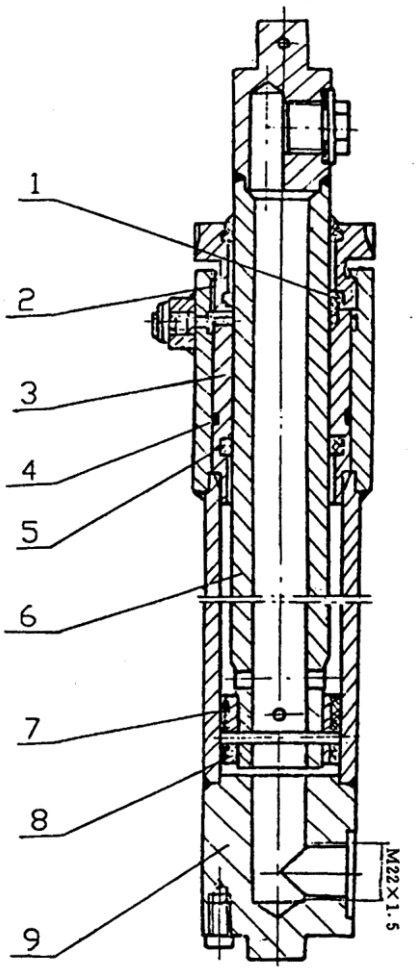


Figure 10-7 Lifting cylinder (left cylinder)
(Figure 10-2, 10-3)
1.Dust ring 2.cylinder head 3.Guide sleeve
4.O-type sealing ring 5.YX type sealing ring
6. Piston rod 7. Support ring 8. Piston
8. Support ring 9. Cylinder

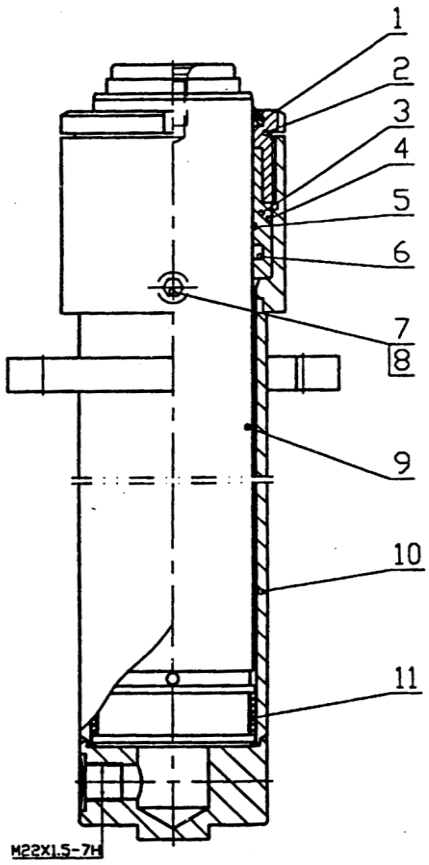


Figure 10-8 Lifting the cylinder freely
(Figure 10-2, 10-3)
1. Dust ring 2. Cylinder head 3. Guide sleeve
4. O-ring 5. O-ring
6. Sealing ring 7. O-ring 8. Bleed plug
9. Piston rod 10. Cylinder 11. Support ring

More than 3 tons of forklift oil cylinder

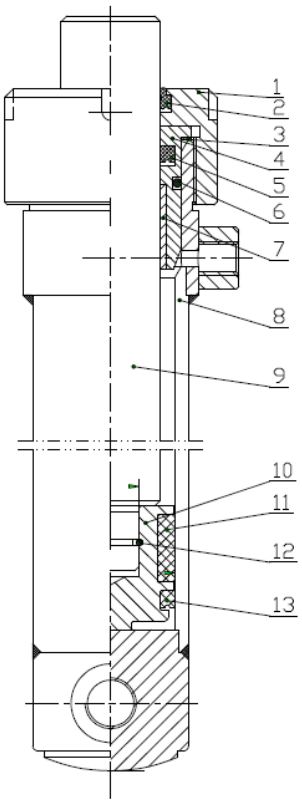


Figure 10-9 Lifting cylinder (left cylinder)
Figure 10-2, 10-3)
1. Cylinder head 2. Dust ring 3. Adjust the washer
4. Guide sleeve 5.ISI seal ring 6. O seal ring
7. Composite bushing 8. Cylinder block 9. Piston rod 10. Piston 11. Support ring 12.OSI sealing ring

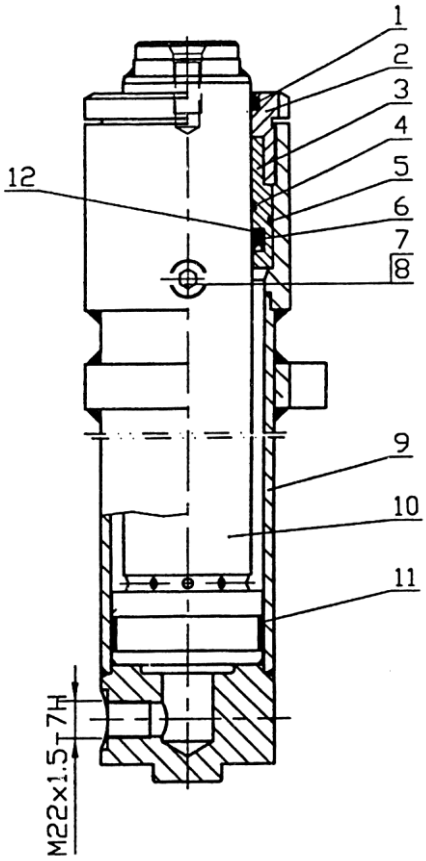


Figure 10-10 Lifting the cylinder freely
(Figure 10-2,10-3)
1. Dust ring 2. Cylinder head 3. Guide sleeve
4. O-ring 5. O-ring 6. Sealing ring
7. Air drain plug 8. O-ring 9. Cylinder assembly
10. Plunger rod assembly 11. Support ring 12. Stop ring

Forklift cylinder under 2.5 tons

4 . Door frame removal and installation adjustment

warning

Fork, fork frame and door frame are heavy parts, and special care should be taken when disassembling.

4.1 Remove the fork and frame assembly

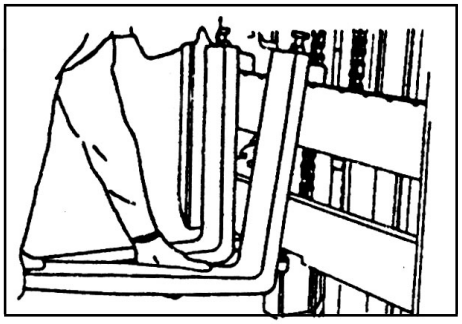
1) First unscrew the bolt in the middle of the fork frame to prevent the fork from falling off, then pull the delivery fork pin, and move the fork to the gap in the middle of the fork frame.

2) Pull the lower part of the delivery fork and remove the fork from the sliding block of the fork.

warning

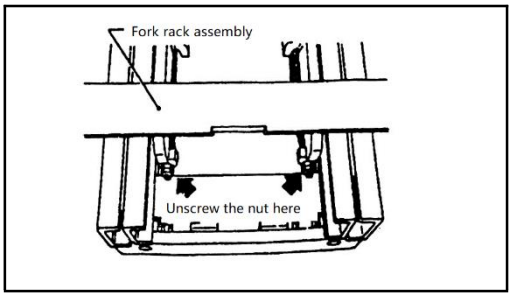
a. Hands and feet should be removed from the fork. Be careful with disassembly! Keep hands and feet away from the fork and the fork holder or under the fork.

b. Do not remove the fork from the top! Prevent the fork from falling and causing crushing injury.



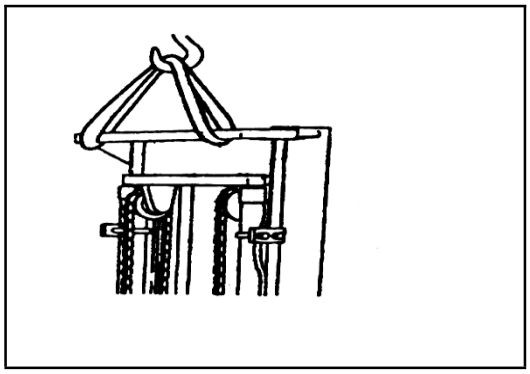
1) Tie the wire rope to the fork frame assembly and lift it with lifting equipment.

2) Unscrew the chain end nut and remove the chain from the lower end of the fork frame assembly.



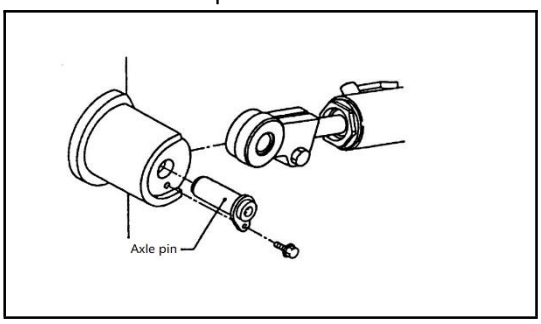
3) Remove the fork frame assembly from the inner gantry.

4） Remove lifting high pressure hose and low pressure return hose.

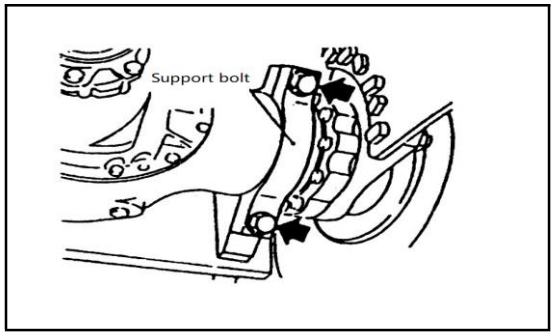


5） Use wire to hang the inner and outer frame assembly

6）Pull out the tip cylinder front end and locate the bolts and shaft pins.



7） Unscrew the bolts of the lower bearing cover of the outer door frame.



8） Remove the frame assembly

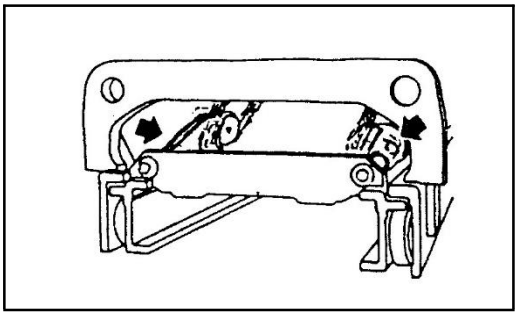
9) The installation sequence is opposite to the disassembly sequence.

4.2 Disassembling Components

warning

The gantry is heavy, so be careful when taking it apart. Remove lifting cylinder

1) Place the door frame flat on the ground, and unscrew the bolts on the lifting cylinder piston rod and the U-bolts and setting screws on the outer door frame.

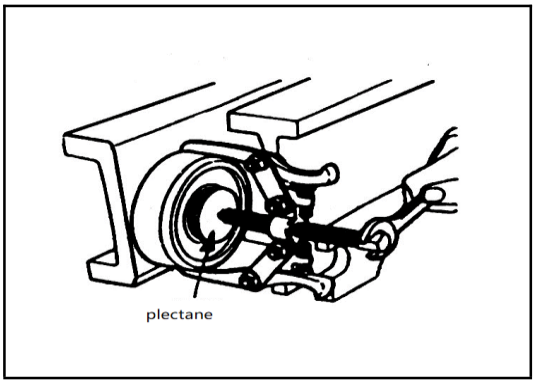


2） Slide the inner door frame and remove the lifting cylinder.

Remove the roller

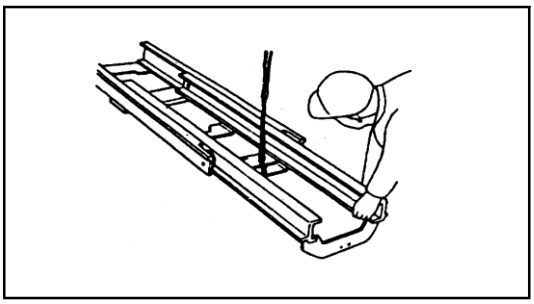
1) Extend the inner door frame down. Remove the middle stop ring of the combination roller and take out the small side roller. Two self-made round plates of about 10 mm thickness, diameters Φ53 and Φ58, are covered on the roller seat, and then the combination roller and the main roller are removed with the bearing remover.

2) If there is no disassembler, carefully pry it open (that is, it must be evenly and symmetrically beaten up, down, left and right), otherwise it will break the roller.



Remove the inner door frame

Attach the wire rope to the middle of the inner frame and slide it out with lifting equipment.



Detection

1) Check whether the roller, roller seat and other related parts are worn or damaged.

2) Replace damaged parts as needed.

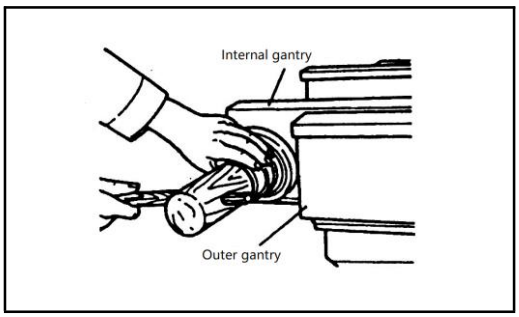
4.3 Assembly and adjustment

warning

Extra care should be taken when the inner and outer door frames are heavily assembled.

Loading roller

Slide the inner door frame into the outer door frame and firmly install the roller.

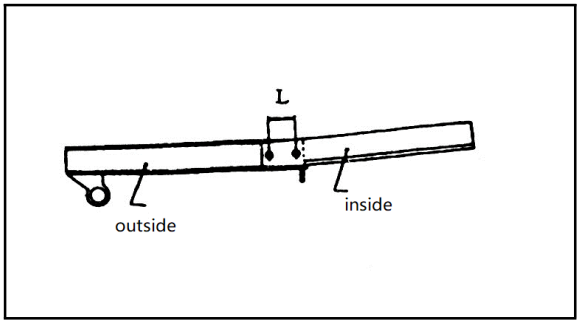


Adjust the clearance between the roller and the door frame channel

1) Set the roller distance between the inner door frame and the outer door frame to "L", and then make factory adjustment.

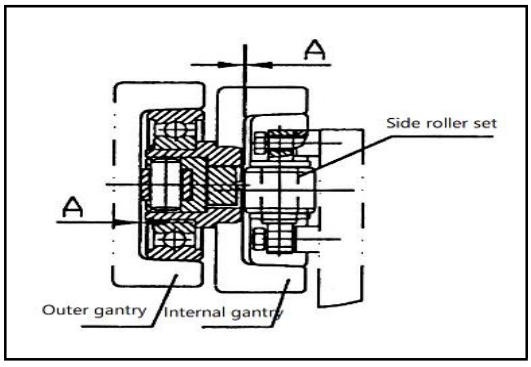
"L" Size unit: mm

Model or tonnage Maximum lifting height	Ⅲ级	Ⅱ级
2500～3300	368	328
3600	388	348
4000	418	378
4500	443	403



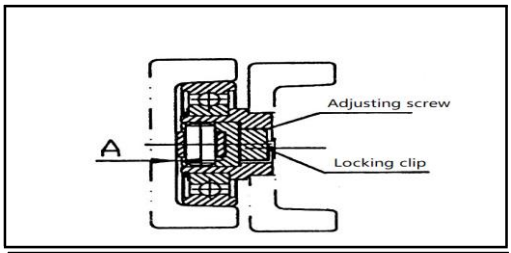
2) Use A thin gasket to evenly adjust the gap "A" on the left and right sides.

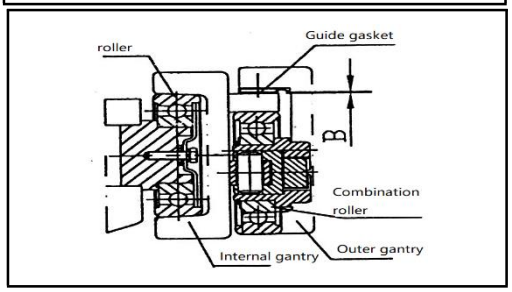
a. For forklifts less than 2 tons, adjust to 0.1mm ~ 0.6mm.



b. Adjust the 2.5t to 3t rollers to 0mm to 0.5mm according to Size needs individual no rubber pads, no rubber pads

3) The clearance of the rolling channel steel

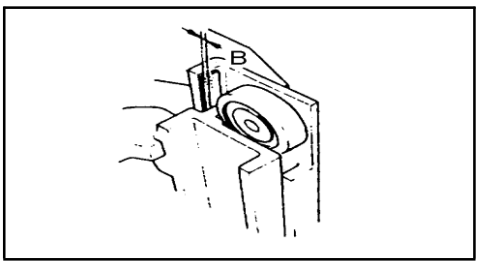




flange is about 0.8mm ~ 1mm, which can not be adjusted here, and the roller should be replaced if the wear is too large.

4) Inner and outer door frame contact surface, roller and channel guide rail. Grease (butter) should be applied. However, in areas with large wind sand, it depends on the body condition to decide whether to wipe it to prevent the sand from sticking.

The gap between the guide plate and the channel steel of the gantry is made between the guide plate and the inner gantry post with a thin gasket The gap "B" is adjusted to 0.1mm ~ 0.8mm, the thin gasket root can be used as needed, and the thickness of the gasket is 0.5mm and 1mm.



Adjust 0.1mm to 0.6mm. There are dowel pins in the roller,To ensure that the side roller in the combination roller is perpendicular to the groove rail guide.

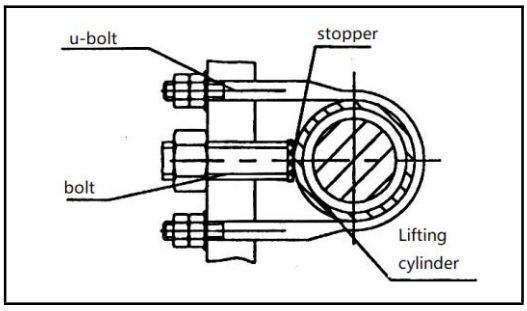
Apply a layer of grease (butter) to the guide plate, install the gantry and lift cylinder on the forklift, connect the return oil hose and high pressure hose.

4.4 Install the left and right lifting cylinders and adjust the cylinder position initially

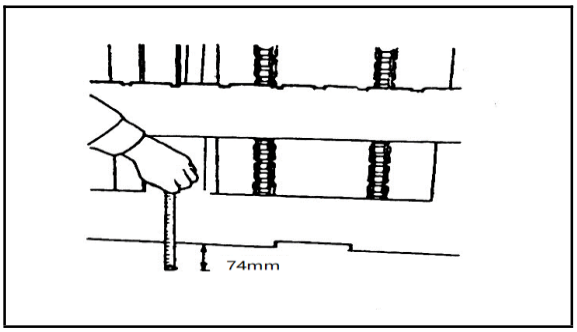
1) Install the left and right oil cylinders into the door frame, and the positioning pin must be installed into the positioning hole of the lower beam of the outer door frame.

2) The upper end of the piston rod is inserted into the cylinder support of the inner gantry. Inner door frame left, right, upper and lower should be basically balanced. If there is a height on the left and right, the gasket should be inserted between the cylinder support hole and the top end of the piston rod for adjustment.

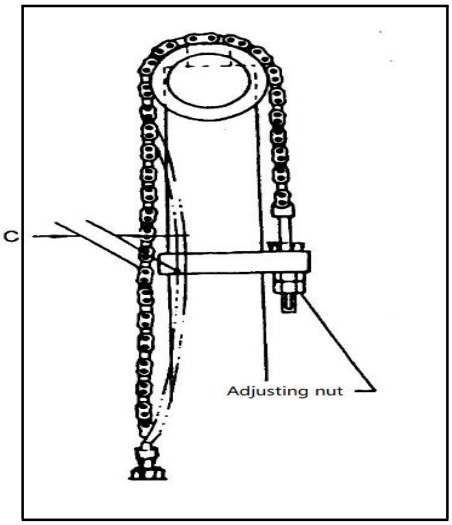
3) Hold the cylinder around the left and right vertical plate (or fixed plate) of the outer frame beam with U-shaped fixing bolts, tighten the screw by hand and lock it with two nuts. Tighten the supporting screw on the other side and add the nut to prevent loosening.



4.5 Adjusting the lifting chain After loading the fork into the inner gantry, install the chain at the same time, and screw two nuts into each of the two ends. The door frame is upright and completely lowered; Adjust the nut at the lower end of the chain so that the distance between the lower fork plate and the ground is 74mm ~76mm.



To adjust the tension of the chain, lower the lifting cylinder until the fork touches the ground. Then adjust the chain adjustment nuts (three nuts at each end) until the length of "C" reaches the specified value when pressing down the middle of the chain with your finger. The length of C is 25mm to 30mm.



4.6 Clearance adjustment between rollers of fork frame assembly

1) Measure the distance "A" between the two channel steel guides of the inner door frame, respectively at the top, middle, middle beam (cross frame) and bottom of the inner door frame.

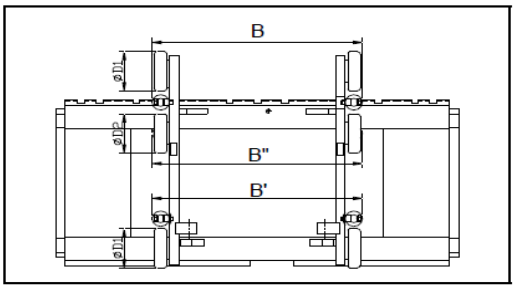
2) Measure the left and right spacing B, B ', B" of the side rollers of the cargo fork frame and the side rollers of the combined rolling.

3) Calculate A-B respectively; A-B '; The difference between A-B "is the gap between the roller and the inner frame channel. Evenly adjust the gaskets of each side roller on the left and right sides. make

The gap between the minimum part of the inner channel steel and the side roller distance of the fork frame is adjusted to 0.2mm ~ 1mm for the upper group and 0.1mm ~ 0.8mm for the lower two groups (combined rolling) :

A-B = 0.2 mm to 1mm

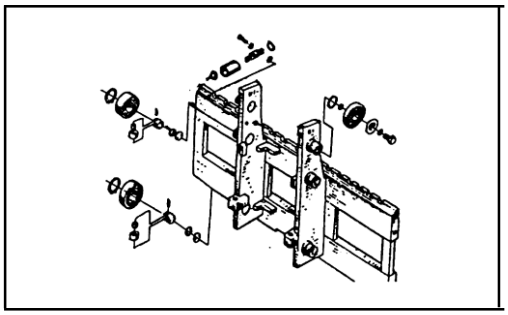
A-B '= 0.1mm to 0.8mm A-B "= 0.1mm to 0.8mm



Thin adjustment gasket 0.5 mm1 mm

a. When using adjustment gaskets, the number of gaskets on the left and right sides must be equal.

b. After the clearance adjustment is completed, push and pull the fork assembly up and down the inner door frame to check whether it is running correctly.



5 . Lift cylinder removal and installation Warning

Stay away from the device as much as possible.

1) Turn off the engine so that the lifting cylinder is in the lowest state (the piston is lowered to the bottom of the cylinder), so that the oil is completely returned to the tank.

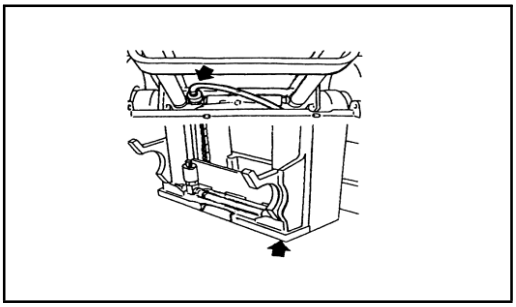
2) Unscrew the left and right cylinder piston rod and the cylinder support bolt on the door frame.

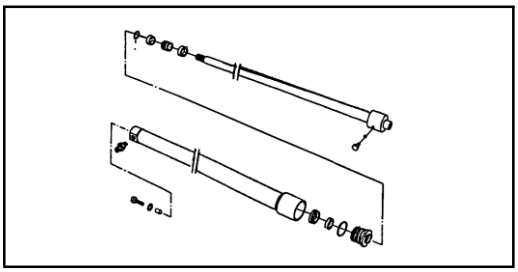
3) Disconnect the oil cylinder return pipe, remove the lower end of the speed limiting valve into the oil high-pressure hose and the two cylinders connected to the high-pressure hose.

4) Remove the U-shaped bolt on the left and right vertical plate (or fixed plate) of the beam on the outer door frame and the tightening screw on the other side.

5) Remove the chain from the door frame.

6) Use the wire rope to lift the inner door frame and take out the left and right lifting cylinder.





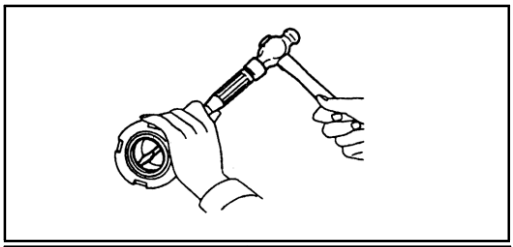
5.1 disintegrate

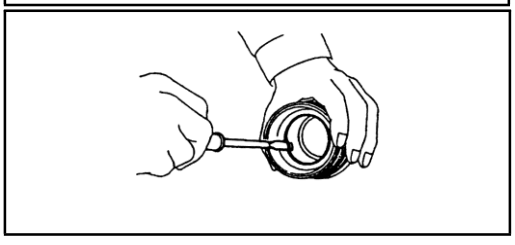
Remove guide sleeve for left and right lift cylinder.

For the left and right lifting cylinder of the container fork under 2.5 tons, remove the cylinder head.

Remove the cylinder head and guide sleeve for the left and right lifting cylinders and all free lifting oils of the container forklift truck above 3 tons. Then, 1) Remove the dust ring.

2） Use a screwdriver to pry out the Y-ring.





notice：Do not re-use the removed dust ring, O-ring and Y-shaped seal ring, be sure to replace.

3) Pull out the piston rod with the piston (the piston is not separately disassembled), and remove the Y-shaped sealing ring at the piston end

5.2 Assemble and replace wearing parts

1) Clean each part with clean oil before assembly.

2) Then clean the guide sleeve and piston with the same type of hydraulic oil as the working tank.

3) Do not let dust or dirt fall into the lifting cylinder.

4) The assembly procedure is the opposite of the above disassembly procedure.

5) Install a Y-shaped sealing ring on the piston.

6) Insert the piston rod assembly (including the piston rod, piston, support ring, Y seal ring) into the cleaned cylinder.

Note: If the mouth of the cylinder has burrs, it must be smooth and clean

Central-mounted to prevent Y-ring from scratching.

7) Install the newly replaced dust ring, Y-shaped sealing ring to the guide sleeve and cylinder head.

Note: The guide sleeve with seal ring shall be lubricated with hydraulic oil of the same grade as that in the working tank.

8) Insert the cylinder head into the piston rod and tighten the cylinder block.

6．Tilt cylinder removal and installation

Warning

The following matters should be noted when removing the oil cylinder:

· Fix the outer door frame with the steel wire on the crane to prevent the door frame from falling after removing the oil cylinder.

Keep your body away from the equipment as far as possible, and do not stand under the fork rack with the fork.

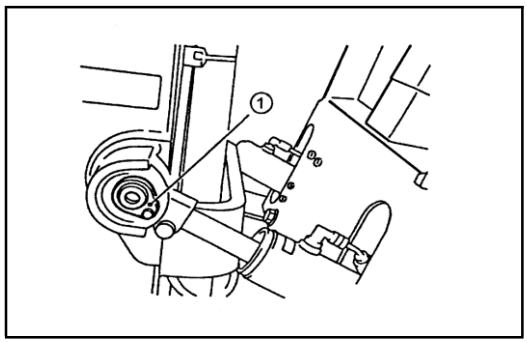
1) Completely put down the fork rack.

2) Remove the bolts from the left and left brackets on the outer door frame and pull out the pin.

3) Remove the tubing at the inlet of the inclined cylinder.

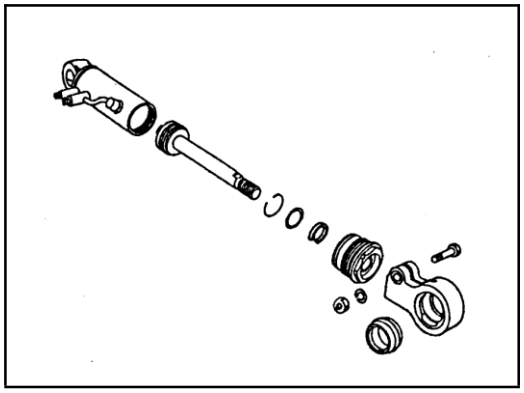
4) Remove the bolt from the frame support, pull out the shaft pin, and remove the tilting oil cylinder.

5) The installation sequence is opposite to the disassembly sequence.



6.1 Disassembled part

1) Clamp the cylinder with a vise, pull the piston rod back and forth when the cylinder is opened at the inlet and outlet, so that the



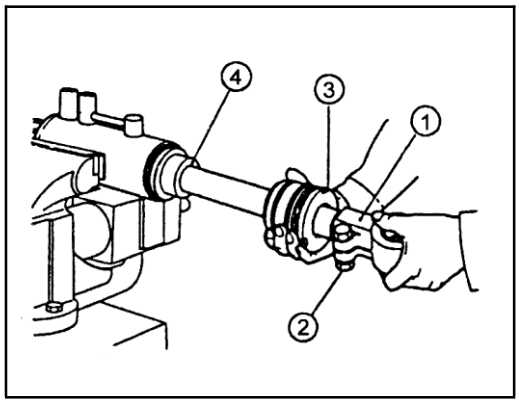
residual oil is discharged from the cylinder.

2) Loosen the earring bolt 2 and unscrew earring 1.

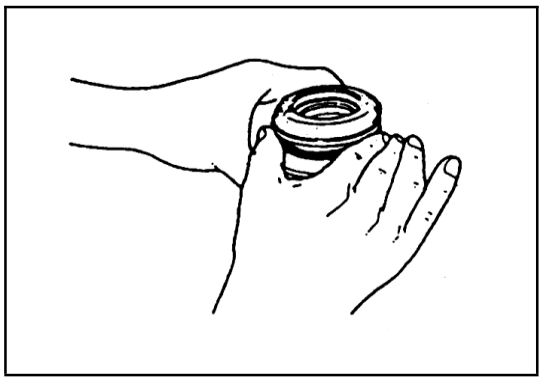
3) Remove guide sleeve 3.

4) Pull out the piston rod assembly 4 (see picture below).

5） Remove all dust rings, O-rings and seals found.



6) Remove the dust ring of the cylinder head. The method is the same as removing the dust ring in the cylinder head of the lifting cylinder(see the previous lifting cylinder disassembly diagram)



7) Remove the O-ring of the outer ring of the guide sleeve.

O-ring and Y-ring seal in inner hole of unloading guide sleeve (see previous lifting cylinder disassembly drawing).

Note: The removed dust ring and Y-shaped sealing ring are discarded.

6.2 Replace the seal ring and assemble

The assembly procedure is the opposite of the disassembly procedure, but the following should be noted:

1) Lubricate each part with clean hydraulic oil.

2) Prevent dust and oil dirt from falling into the oil cylinder.

3) Cylinder mouth and inlet and outlet should be prevented from touching hair.

4) Carefully align, push the piston rod into the cylinder, especially to prevent scratching the Y-shaped seal ring.

5) Between the sealing rings, apply the same hydraulic oil as the working oil to lubricate.

6) Be careful not to scratch the O-ring on the outer ring when loading.

7) After the cylinder head is screwed in, don't forget to install nylon plugs and tightening screws.

7 ． Precautions for commissioning after loading

1) The front and back Angle of the adjusting frame will park the forklift on the flat ground and operate the multi-way valve operation

Longitudinal handle, so that the front and back of the forklift door frame fully tilt. According to the installation and adjustment data (see above), adjust the tilt cylinder front piston rod and earring joint thread length until it meets the data of the tilt back Angle, and then lock the tilt cylinder end earring (see the previous table for tightening the bolt torque of M10).

2) Readjust the installation position of the two left and right lifting cylinders

a. Observe whether the two cylinders are synchronized when lifting and lowering, and adjust the gasket between the piston rod and the inner frame support.

b. Loosen the two nuts of the U-shaped fixing bolt, and then raise and lower the door frame several times, so that the U-shaped bolt and the oil cylinder relative position is appropriate. Then tighten the double screw on the U-bolt and the setting screw on the other side. In this way, the life of the lift cylinder can be improved and the wear of the piston rod can be reduced.

3) The tightening force of bolts and screws is shown in the previous table. Please refer to the tightening torque of ordinary bolts stipulated by our company according to their screw diameter (see the operation and maintenance manual accompanying this).

XVI、Electrical system

Warning： Before checking any electrical components, remove conductive items such as jewelry to prevent short circuits, turn off the starting switch and disconnect the ground wire.

Instructions

For ease of distinction, the conductor has a colored sheath. On a circuit diagram, colors are represented by one or two letters. Before performing any electrical repairs, make sure that the battery connection is disconnected.

Conductor color

The wire color is indicated by one or two letters.

B: black, N: brown, G: green,

U: blue, O: orange, R: red,

W: white, Y: yellow, S: gray,

P: Purple

The main harness is usually monochromatic. The other is represented by two colors:

B/W: black and white line

G/Y: green and yellow lines

Detection

Check all circuits with reference to the wiring diagram. Continuity or short circuit testing with a conventional test light or multimeter. Before testing, make sure that:

1, each electrical part or each wire is fixed on its terminal joint.

2, each joint is firmly connected in its original place, and there is no rust or dirt.

3, each wire surface is not broken, aging or other damage.

4. Keep a safe distance between each joint and its adjacent metal parts.

5, each wire is fixed on the correct terminal or connector.

6. Separate wiring from parts with sharp edges.

7. The wiring is separated from all rotating or moving parts.

8, the length of the wire between the fixed part and the moving part should be enough to withstand vibration and vibration.

9. Keep a safe distance between wiring and high temperature objects such as exhaust pipes.

Fuse box assembly

Fuse wire

Disassembly

1. Turn the key switch to "OFF";

2. Press the lock on the fuse box cover, and then open the cover;

3. Remove the fuse from the box;

Instructions

If the fuse is damaged, replace it with a new one. See the picture on the right.

① If the fuse is damaged, determine the cause before installing a new fuse;

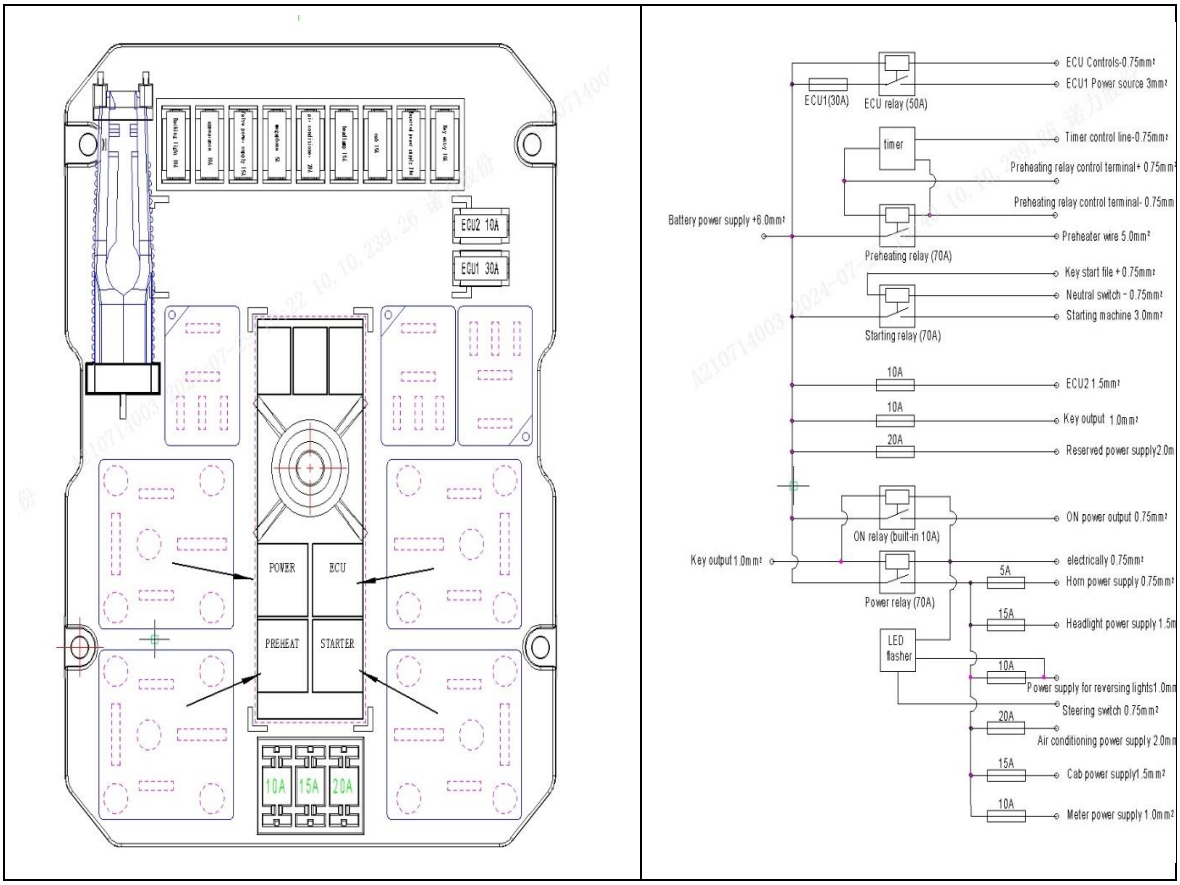
② Do not use fuses higher than the design value;

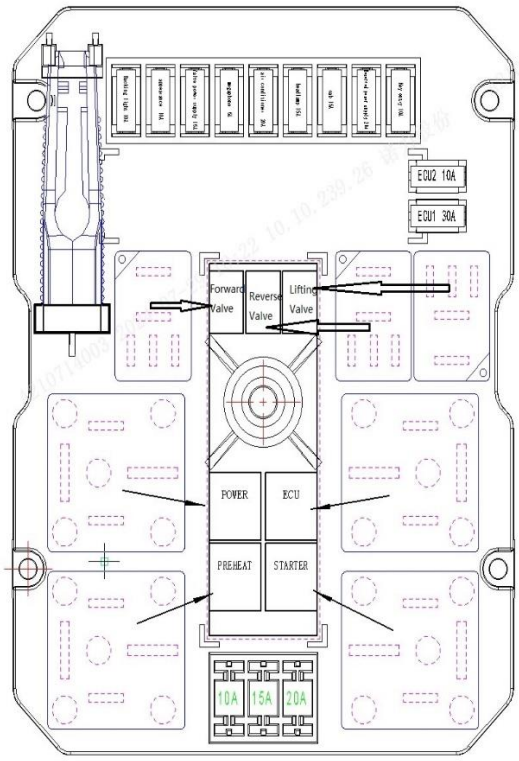
③ Check the fixing frame of the fuse. If rust and dirt are found, sand with fine sandpaper until the holder and contact surface are smooth and clean. Poor contact of the fuse bracket will usually increase the voltage drop and line heat, and even the line work is not normal.

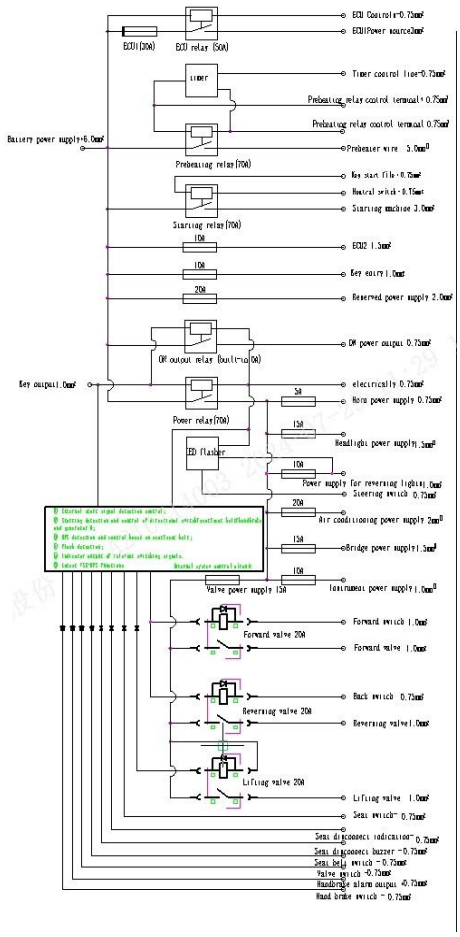
Fuse location

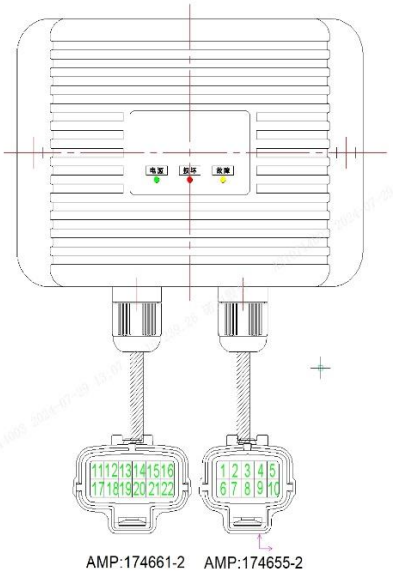
List of fuses

position		capacity	Application unit
1	lamplight	20A	Headlight, small light, width light
2	appearance	10A	Instrument, alarm light
3	regulator	10A	Regulator power supply
4	Reverse light switch	20A	Horn, reverse light switch
5	Brake light switch	10A	Brake light switch, turn signal, flasher
6		10A	Preheating relay, preheating timer









174655-2 definition			
Serial number	Wire diameter	Line color	Feature
1	0.5	Blue and white	Reverse input
2	0.5	Yellow and white	Seat switch
3	0.5	blue-black	Seat indicator
4	0.5	Blackish yellow	Seat alarm buzzer
5	0.5	Reddish black	Speed signal input
6	1.0	Greenish black	Function selector switch
7	1.25	black	Mains negative
8	1.25	Reddish yellow	Mains positive
9	1.0	White and blue	Forward solenoid valve
10	1.0	White and black	2-speed output

174661-2 definition			
Serial number	Wire diameter	Line color	Feature
11	0.5	Bluish red	2-speed input
12	0.5	Bluish yellow	Forward file input
13	1.0	white	Backward solenoid valve
14	1.0	green	Parking without brake buzzer +
15	0.5	Reddish yellow	dynamo D+
16	1.0	Black and white	Parking brake input
17	1.0	brown	Hydraulic locking output
18	1.0	pink	Start output
19	0.5	gray	Start input
20	0.5	orange	Generator speed signal (reserved)
21	1.0	red	Power supply + normal fire
22	1.0	Greenish blue	Seat belt switch signal input -

Fusible wire

A molten fusible wire is easily observed and touched with a finger. If you are not sure if it is broken, you can test it with a multimeter or light bulb.Notice：

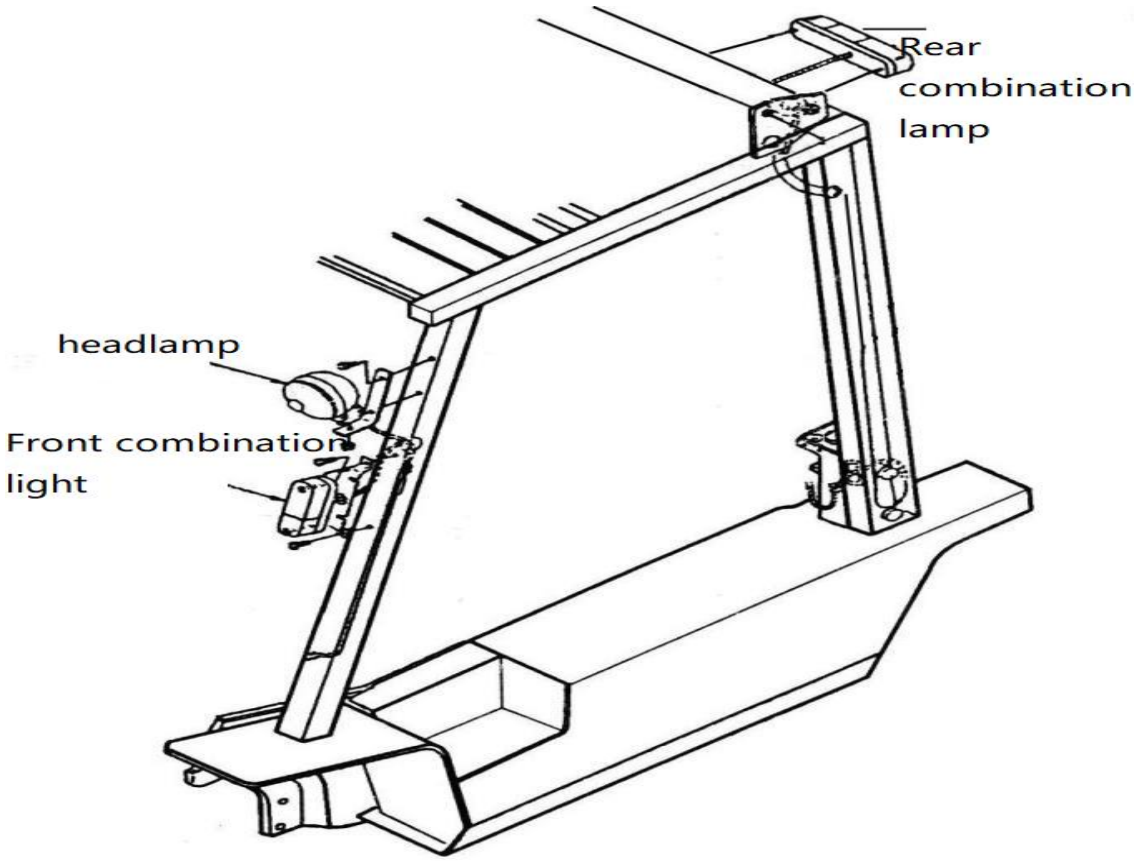
1, if the fusible line is burned, it may be because of a short circuit (power supply or current is too large). No matter what the reason, please check carefully and troubleshoot.

2, fusible wire will heat, do not wrap with tape paper. Finally, do not put fusible wire near other **wiring or rubber and other parts.**

Lighting system bulb grid

<table>
<tr><td>bulb</td><td colspan="2">wattage</td></tr>
<tr><td>headlamp</td><td colspan="2">12V-35W</td></tr>
<tr><td rowspan="2">Front sidelight
Turn indicator Width indicator</td><td>bulb</td><td>LED</td></tr>
<tr><td>12V-21W
12V-10W</td><td>12V</td></tr>
<tr><td rowspan="2">Combined rear lamp
Brake light, wide turn signal
Backing light</td><td>bulb</td><td>LED</td></tr>
<tr><td>12V-21W/5W
12V-21W
12V-10W</td><td>12V</td></tr>
<tr><td>Combination instrument
Floodlight warning light</td><td colspan="2">12V-2W
12V-2W</td></tr>
</table>

Position of lamp



Headlamp

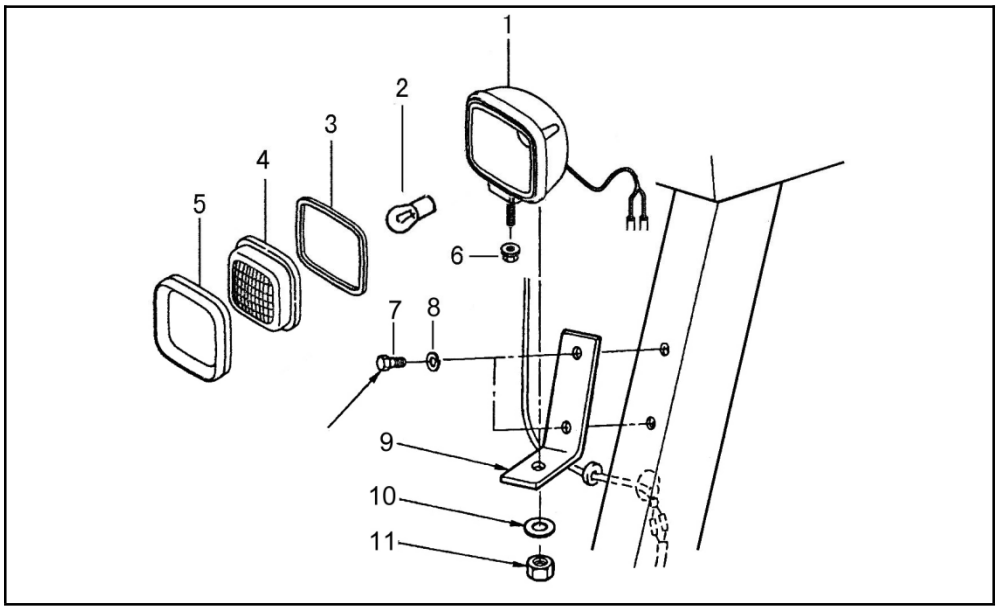
Disassembly and installation

1. Remove the headlamp fixing nut.

2. Disconnect the distribution connector.

3, remove the screw, astigmatism glass; And replace it with a new bulb.

4, the installation and disassembly steps are opposite.



Front combination light

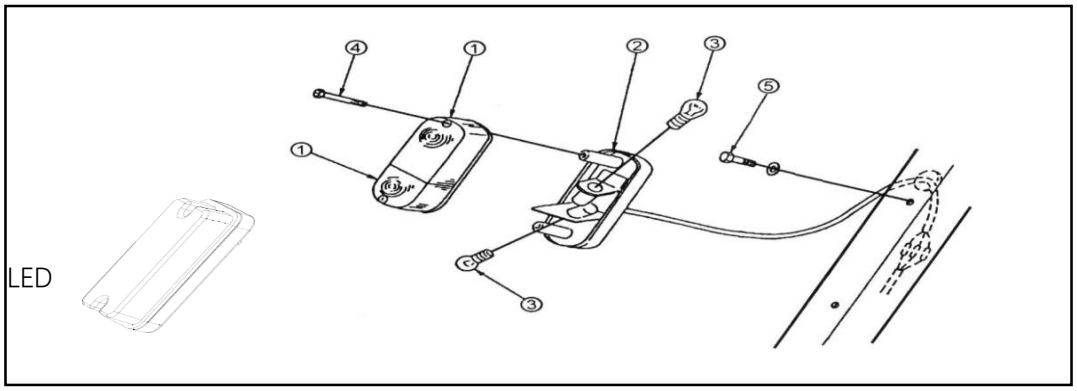
Disassembly and installation

1. Remove the screws fixing the support.

2. Disconnect the distribution connector.

3. Remove the astigmatic glass fixing screw and replace it with a new bulb; LED lights need to be replaced as a whole.

4, the installation and disassembly steps are opposite.



Rear combination lamp

Disassembly and installation

1. Remove the fixing screw of the rear combination lamp.

2. Disconnect the distribution connector.

3. Remove the astigmatic glass fixing screw and replace it with a new bulb; LED lights need to be replaced as a whole.

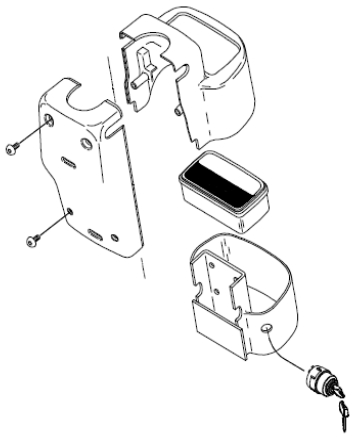
4, the installation and disassembly steps are opposite.

Meters, sensors and relays

Check that the relay circuit is on, connect it to the coil with a suitable voltage (battery supplied) or disconnect it, and then use a multimeter (set to ohm) to check that the contact circuit is on.

Disassembly and installation

Instrument assembly



1. Remove the instrument housing fastening bolt.

2, open the instrument housing, disconnect the light, instrument and key open and close wiring the connector. When the instrument is connected to the electrical system, it cannot be cleaned with water or steam.The installation and removal steps are reversed.

Fuel gauge, temperature gauge, hour meter and warning light

1, remove the tightening bolt of the meter plate, and then separate the meter plate and the meter housing.

2, remove the front protective cover fastening bolts, and then separate the front protective cover and instrument plate.

3. Remove the dashboard

4. Remove the meter fastening bolt from the PC board, and then remove the meter.

5, unscrew the warning light from the PC board (all warning lights can be removed from the combined instrument separately).

6, the installation and disassembly steps are opposite.

Light switch

Disassembly

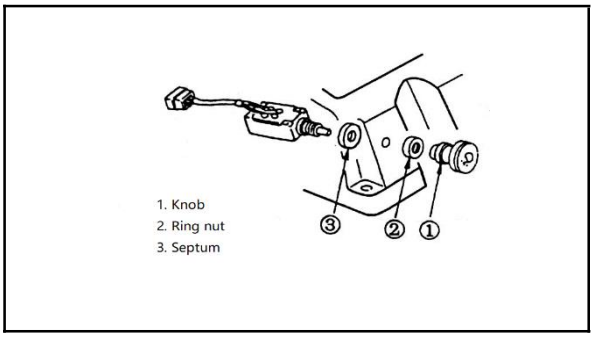
1. Remove the combined instrument.

2. Remove knob, nut and spacer.

3. Disconnect the distribution connector

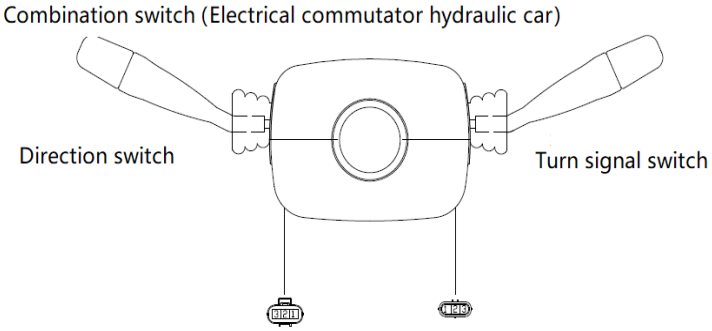
Inspect

Disconnect the switch connector and check whether the contacts are properly connected.



Contact point position	1	2	4	5
O (off)	×			
I (lamplet)	×	×		×
II (headlamp)	×		×	×

Combination switch （Electrical commutator hydraulic car）

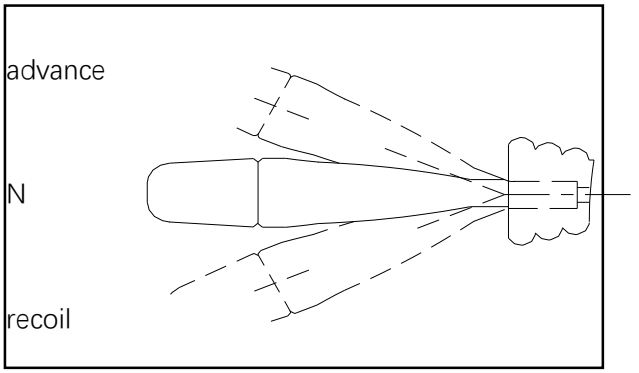


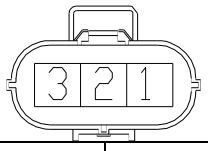
Directional switch removal

1. Remove the combined instrument.
2. Remove the screw and disconnect the wiring connector.
3, the installation order is opposite to the disassembly order.

Directional switch check

Disconnect the switch connector and check whether the contacts are properly connected. Use a multimeter (set to Ohm) to check whether the following positions of the direction switch are on: forward, N, and backward.





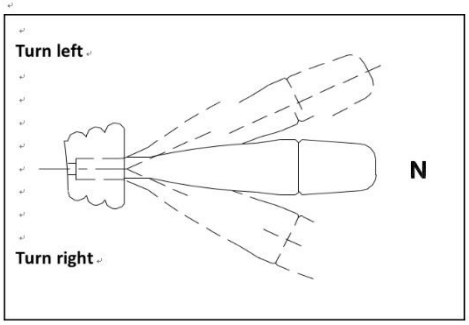
Switch position	Contact point
advance	1-3
N	nonconductive
recoil	2-3

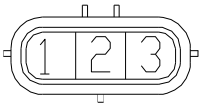
Turn signal switch disassembly

1. Remove the combined instrument.
2. Remove the screw and disconnect the wiring connector.
3, the installation order is opposite to the disassembly order. After installing the turn signal switch, ensure that the distance between the turn signal switch and the top of the steering column is 42mm.

Inspect

Use a multimeter (set to ohm) to check that the turn signal switch is on at the following positions: L, N, R.





Switch position	Contact point
Turn left	1-2
N	nonconductive
Turn right	1-3

Turn signal switch Turn signal switch

disassembly

1. Remove the combined instrument.

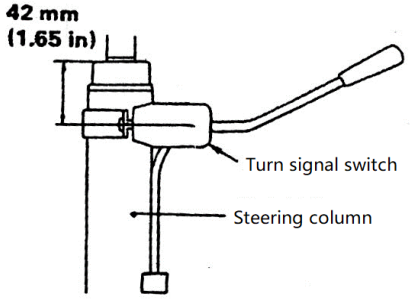
2. Remove the screw and disconnect the wiring connector.

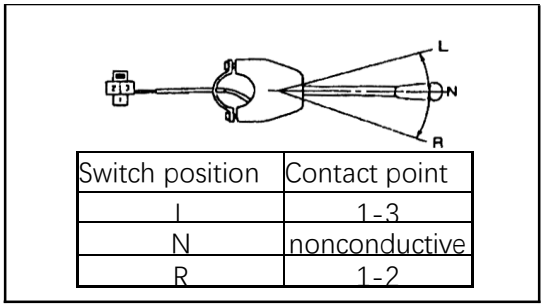
3, the installation order is opposite to the disassembly order.

After installing the turn signal switch, ensure that the distance between the turn signal switch and the top of the steering column is 42mm.

Inspect

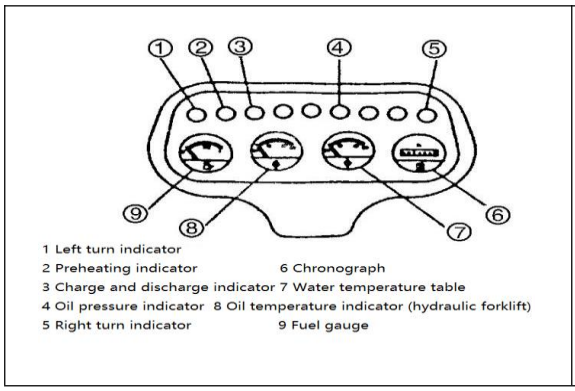
Use a multimeter (set to ohm) to check that the turn signal switch is on at the following positions: L, N, R.

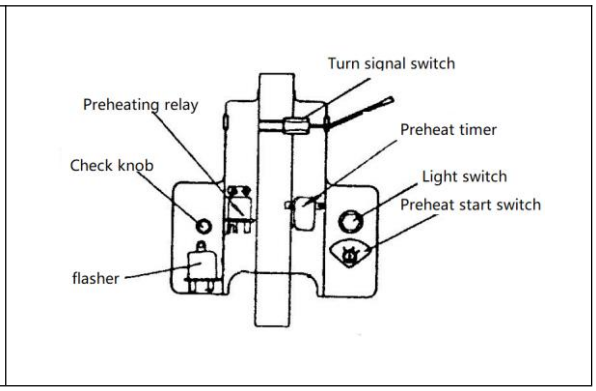




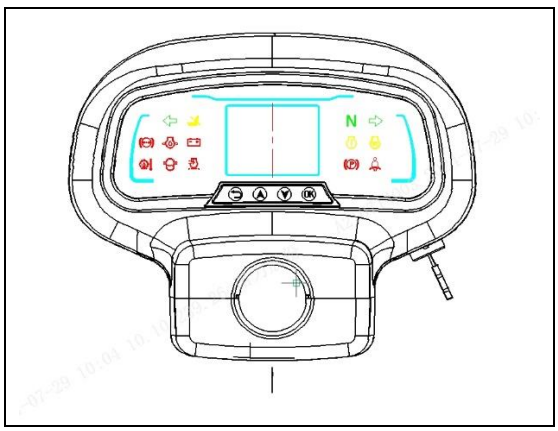
Switch position	Contact point
L	1-3
N	nonconductive
R	1-2

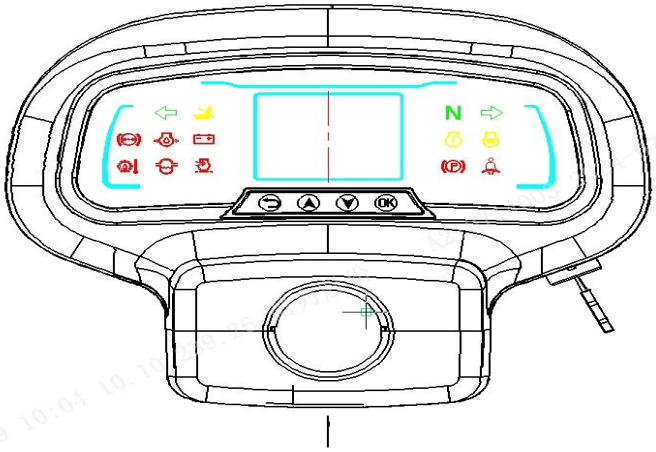
Instrument assembly





X5 instrument





X5 engine fault code table

Fault description	SPN	FMI
The air conditioner compressor circuit is open	1351	05
The air conditioner compressor driver chip in the electronic control unit (ECU) is	1351	06
Variable displacement air conditioner compressor drive circuit open	2978	05
Variable displacement air conditioner compressor driver chip overheating	2978	06
The variable displacement air conditioner compressor drive circuit shorted the power	2978	03
Variable displacement air conditioner compressor drive circuit short circuit to the ground	2978	04
The air conditioner compressor drive circuit shorted the power supply	1351	03
The air conditioner compressor drive circuit is short to the ground	1351	04
The CAN signal of the air conditioner switch is not trusted	985	14
Air conditioner switch CAN signal receiving timeout (does not receive air conditioner switch CAN message within a specified period of time)	985	19
The difference between the set amount of air and the actual fresh intake in regenerative mode is higher than the upper limit (the fresh intake is too small).	1241	15
The difference between the set amount of air and the actual fresh intake in regenerative mode is lower than the lower limit (too much fresh intake).	1241	17
The difference between the set air quantity and the actual fresh intake is higher than the upper limit (the fresh intake is too small).	1241	00
The difference between the set air quantity and the actual fresh intake is lower than the lower limit (the fresh intake is too large)	1241	01
The exhaust gas recirculation (EGR) control takes too long to switch from the regenerative state to the normal state	1241	11
Reliability failure of temperature sensor during system cold start (combination 0)	5201	02
Reliability failure of temperature sensor during system cold start (Combination 1)	5202	02
Reliability failure of temperature sensor during system cold start (Combination 2)	5202	02
Reliability failure of temperature sensor during system cold start (Combination 3)	5202	02
Reliability failure of temperature sensor during system cold start (Combination 4)	5202	02
The reliability of the temperature sensor fails during the cold startup of the system	5202	02
The voltage signal of the battery inside the ECU is too high	168	03
The voltage signal of the battery inside the ECU is too low. Procedure	168	04
The brake signal is not trusted, the main brake signal and the secondary brake signal do not change at the same time	597	02

Fault description	SPN	FMI
The main brake signal is faulty	1067	12
Secondary brake signal malfunction	1068	12
CAN A passive failure	522000	14
CAN B passive fault	522001	14
CAN C passive fault	522002	14
CAN A communications blackout	522000	12
CAN B communication is down	522001	12
CAN C communication is down	522002	12
The absolute value of the water temperature sensor detects the fault (the water temperature does not reach the threshold value within a certain period of time)	110	17
The rationality of the dynamic value of the water temperature sensor detects the fault (the appreciation of the water temperature in a certain period of time does not reach the threshold value)	110	18
The engine water temperature is above the limit	7817	04
Engine water temperature is below the lower limit	7817	05
The temperature sensor voltage is higher than the upper limit	110	03
The temperature sensor voltage is lower than the lower limit	110	04
Clutch signal is not credible	598	02
Clutch signal failure (CAN signal error)	598	19
ACK CAN reply signal sending time out (i.e. signal loss)	522004	19
External environment (AmbCon) CAN signal frame transmission timeout (i.e.	171	19
DD CAN received frame signal length error	522061	14
DD CAN signal reception timeout (i.e. signal loss)	522061	02
Urea Injection controller (DCU) CAN signal reception time out (i.e. signal loss)	522012	11
Urea Injection controller (DCU) CAN signal reception time out (i.e. signal loss)	522012	31
Obd-related faults are used for urea injection control unit (DCU) activation torque limits	522012	00
Obd-related faults are used for urea injection control unit (DCU) activation torque limits	522012	01
Obd-related faults are used for urea injection control unit (DCU) activation torque limits	522012	02
Obd-related faults are used for urea injection control unit (DCU) activation torque limits	522012	03
Obd-related faults are used for urea injection control unit (DCU) activation torque limits	522012	04
DM1DCU CAN signal reception timeout (i.e. signal loss)	522012	19
EEC1 CAN signal transmission timeout (i.e. signal loss)	522014	19
EEC2 CAN signal transmission timeout (i.e. signal loss)	522015	19
The CAN communication between the electronic control unit (ECU) and the nitrogen and oxygen sensor is interrupted	522016	19
EFL_P1 CAN signal reception timeout (i.e. signal loss)	522017	19

Fault description	SPN	FMI
EngTemp CAN signal transmission timeout (i.e. signal loss)	522020	19
FlEco CAN signal transmission timeout (i.e. signal loss)	185	19
GPS key/timeout failure	00	00
EEPROM fault	00	00
Confidential fault	00	00
T3 Timeout fault	00	00
Timeout error accepted	00	00
Engine speed anomaly	00	00
EEPROM fault	00	00
The EEPROM write fails. Procedure	00	00
Injection interruption	00	00
Engine speed limit activation	00	00
The GPS CAN signal is faulty	00	00
GPS ID error	00	00
Confidential fault	00	00
The message format from the Inbox is faulty. Procedure	00	00
Time-out fault	00	00
Speed limit activation	00	00
INCON CAN signal transmission timeout (i.e. signal loss)	522025	19
FIC CAN signal transmission timeout (i.e. signal loss)	522026	19
Handshake protocol failure	00	00
Handshake protocol failure	00	00
ShutDwn CAN signal transmission timeout (i.e. signal loss)	522031	19
TCO1 CAN receive frame signal length error	522032	14
TCO1 CAN signal reception timeout (i.e. signal loss)	522032	19
TSC1AE message frame active loss fault	522035	08
TSC1AE information frame passive loss fault	522035	10
TSC1AR CAN signal active reception timeout (i.e. signal loss)	522036	08
TSC1AR CAN signal passive reception timeout (i.e. signal loss)	522036	10
The TSC1DE message frame is actively lost. Procedure	522037	08
TSC1DE passive frame loss fault	522037	10
TSC1DR CAN signal active reception timeout (i.e. signal loss)	522038	08
TSC1DR CAN signal passive reception timeout (i.e. signal loss)	522038	10
The TSC1PE information frame is automatically lost. Procedure	522039	08

Fault description	SPN	FMI
The TSC1PE information frame is passively lost	522039	10
The TSC1TE message frame is automatically lost. Procedure	522040	08
TSC1TE passive frame loss fault	522040	10
TSC1TR CAN signal active reception timeout (i.e. signal loss)	522041	08
TSC1TR CAN signal passive reception timeout (i.e. signal loss)	522041	10
The TSC1VE information frame is automatically lost. Procedure	522042	08
TSC1VE Passive frame loss fault	522042	10
TSC1VR CAN signal active reception timeout (i.e. signal loss)	522043	08
TSC1VR CAN signal passive reception timeout (i.e. signal loss)	522043	10
TSC1AE CAN receive frame signal length error	522035	14
TSC1AE CAN signal reception timeout (i.e. signal loss)	522035	19
The TSC1AR CAN receive frame signal length error	522036	14
TSC1AR CAN signal reception timeout (i.e. signal loss)	522036	19
The TSC1DE CAN receive frame signal length error	522037	14
TSC1DE CAN signal reception timeout (i.e. signal loss)	522037	19
The TSC1DR CAN receive frame signal length error	522038	14
TSC1DR CAN signal reception timeout (i.e. signal loss)	522038	19
The TSC1PE CAN receive frame signal length error	522039	14
TSC1PE CAN signal reception timeout (i.e. signal loss)	522039	19
The TSC1TE CAN receive the frame signal length incorrectly	522040	14
TSC1TE CAN signal reception timeout (i.e. signal loss)	522040	19
The TSC1TR CAN receive frame signal length error	522041	14
TSC1TR CAN signal reception timeout (i.e. signal loss)	522041	19
The TSC1VE CAN receive the frame signal length incorrectly	522042	14
TSC1VE CAN signal reception timeout (i.e. signal loss)	522042	19
The TSC1VR CAN receive frame signal length error	522043	14
TSC1VR CAN signal reception timeout (i.e. signal loss)	522043	19
TxCCVS CAN signal transmission timeout (i.e. signal loss)	522044	19
TxPGNRQGlb CAN signal reception timeout (i.e. signal loss)	522045	19
TxPGNRQ CAN signal reception timeout (i.e. signal loss)	522046	19
VEP1 CAN signal transmission timeout (i.e. signal loss)	522056	19
WFI CAN signal transmission timeout (i.e. signal loss)	522057	19
Vehicle performance limit function activated	520198	11
The cruise control key signal is not reasonable	596	02

Fault description	SPN	FMI
The internal chip Cy327 of the electronic control unit (ECU) is faulty	520222	02
The battery voltage is too high, causing related components to stop working	444	03
The battery voltage is too low, causing related components to stop working	444	04
Exhaust Gas Recirculation (EGR) cooling bypass valve actuator circuit is open	5393	05
The drive chip of the exhaust gas Recirculation (EGR) cooling bypass valve in the electronic control unit (ECU) overheats	5393	02
The drive circuit of the exhaust Gas Recirculation (EGR) cooling bypass valve shorted the power supply	5393	03
The drive circuit of the exhaust gas recirculation (EGR) cooling bypass valve is short to the ground	5393	04
The EEPROM area of the storage unit in the electronic control unit (ECU) fails to be read	2802	14
The EEPROM area of the storage unit in the electronic control unit (ECU) is faulty	2802	12
Exhaust gas recirculation (EGR) valve operating current limited	27	06
The self-learning value of the exhaust gas recirculation (EGR) valve at the fully closed position exceeds the limit	27	17
The self-learning value of the full open position of the exhaust gas recirculation (EGR) valve exceeds the mechanical point of the valve	27	15
Exhaust gas recirculation (EGR) valve control deviation exceeding the limit (due to low temperature during cold start)	27	12
The difference between the set value and the actual value of the EGR valve opening is higher than the upper limit value (the positive deviation is too large).	27	18
The difference between the gas recirculation (EGR) valve opening set value and the actual value The difference is lower than the lower limit value (the negative deviation is too large)	27	16
Exhaust Gas recirculation (EGR) H-bridge drive circuit is open	520282	05
Exhaust Gas Recirculation (EGR) H-bridge drive current is too large	520282	06
The exhaust Gas recirculation (EGR) H-bridge driver chip in the electronic control unit (ECU) overheating	520282	12
Exhaust Gas recirculation (EGR) H-bridge drive circuit high end to power short	520282	00
Exhaust gas recirculation (EGR) H-bridge drive circuit low end to the power short	520282	03
Exhaust gas recirculation (EGR) H-bridge drive circuit high end to ground short	520282	01
Exhaust gas recirculation (EGR) H-bridge drive circuit low end to ground short	520282	04
Exhaust Gas Recirculation (EGR) H-bridge drive current is too large	520282	08
The exhaust Gas recirculation (EGR) H-bridge driver chip in the electronic control unit (ECU) overheating	520282	07
The exhaust gas recirculation (EGR) H-bridge drive circuit voltage is too low	520282	18
The exhaust gas recirculation (EGR) valve is stuck in the closed position	27	01
The exhaust gas recirculation (EGR) valve is stuck in the open position	27	00
The physical value of the EGR valve position sensor exceeds the upper limit	27	20
Exhaust Gas recirculation (EGR) valve position sensor physical value below lower limit	27	21
EGR valve spring failure	520132	02
The gas recirculation (EGR) valve position sensor voltage is higher than the upper	27	13
Exhaust Gas recirculation (EGR) valve position sensor voltage below lower limit	27	14
Exhaust gas recirculation (EGR) valve drive circuit is in poor contact	27	11
Fuel injection cut-off request instruction	1109	11

Fault description	SPN	FMI
Engine overspeed indication	1769	11
Engine creep request failure	520299	02
Engine creep request failure	520300	02
Engine creep request failure	520301	02
Engine creep request failure	520302	01
Engine creep request failure	520303	02
Speed output drive circuit is open	1623	05
The inner speed output driver chip of the electronic control unit (ECU) is overheating	1623	06
The speed output drive circuit shorted the power supply	1623	03
Speed output drive circuit short circuit to ground	1623	04
Camshaft signal interference or signal loss fault	4201	02
No camshaft signal detected	4201	12
The deviation between camshaft signal and crankshaft signal is too large	4201	14
The crankshaft signal has interference or signal loss fault	4203	02
No crankshaft signal detected	4203	12
Switch type low-speed fan control circuit is open	4815	05
Switch type high speed fan control circuit is open	4815	20
The switch type low-speed fan in the electronic control unit (ECU) controls the driver chip overheating	4815	06
The switch type high-speed fan in the electronic control unit (ECU) controls the driver chip overheating	4815	12
The switch-type low-speed fan control circuit shorted the power supply	4815	03
Switch-type high-speed fan control circuit shorted the power supply	4815	21
The switch type low-speed fan control circuit is short to the ground	4815	04
Switch type high-speed fan control circuit short circuit to the ground	4815	22
Stepless fan drive circuit is open	4815	07
The stepless fan driver chip in the electronic control unit (ECU) overheats	4815	08
The stepless fan drive circuit shorted the power supply	4815	09
The stepless fan drive circuit is short to the ground	4815	10
The frequency signal of the fan speed sensor is too long. Procedure	1639	08
Fan speed is too high	1639	03
Fan speed is too low	1639	04
Ignition sequence first cylinder oil level correction (FBC) exceeds limit	520268	11
Ignition sequence No. 2 cylinder volume correction (FBC) exceeds limit	520268	20
Ignition sequence 3rd cylinder oil level correction (FBC) exceeds limit	520268	21
Ignition sequence 4th cylinder oil level correction (FBC) exceeded limit	520268	22

Fault description	SPN	FMI
Fuel consumption indicator drive circuit open	250	05
The fuel consumption rate in the electronic control unit (ECU) shows that the	250	02
The fuel consumption rate shows that the drive circuit is short circuited to the power supply	250	03
The fuel consumption rate indicates that the drive circuit is short to the ground	250	04
Water sensor voltage in oil is higher than upper limit	520264	03
The water sensor voltage in the oil is below the lower limit	520264	04
Water in the oil is faulty	520264	11
Oil-water separation indicator light drive circuit open	520267	05
The oil/water separation indicator drive chip in the electronic control unit (ECU) is overheating	520267	02
The oil-water separation indicator drive circuit is short circuited to the power supply	520267	03
The driving circuit of oil-water separation indicator light is short to ground	520267	04
The fuel temperature sensor voltage signal is higher than the upper limit	174	03
The fuel temperature sensor voltage signal is below the lower limit	174	04
The GNS signal is untrusted	00	00
Transmission signal from CAN bus is faulty	00	00
The preheating indicator driver circuit is open	626	05
The driver chip of the preheat indicator in the electronic control unit (ECU) is overheating	626	06
The preheating indicator drive circuit shorted the power supply	626	03
The driver circuit of the preheating indicator is short to the ground	626	04
GCU-R failure: Relay failure/preheat plug failure/short circuit or overload	5325	26
GCU-R fault: Relay stuck/short circuit or overload	5326	27
Preheat plug control drive circuit open	676	00
The preheating plug in the electronic control unit (ECU) controls the driver chip overheating	676	01
The preheat plug drive circuit shorted the power supply	676	05
The preheating plug drive circuit is short to the ground	676	06
When the high-low idle adjustment is activated, the engine speed exceeds the upper limit	188	00
When the high and low idle speed adjustment is activated, the engine speed exceeds the lower limit	188	01
The injector injection times are indicated by the capacity limitations of the electronic control unit (ECU) charging module	520210	11
The injection times of the injector are indicated by the limit of the oil balance of the high pressure pump	520210	20
Injector injection times are indicated by system limits	520210	21
Injector injection times are indicated by the operating time limit	520210	22
Rail pressure cannot be established during startup	520428	02
Engine failure to start	520211	11
Firing sequence The first cylinder injector drive circuit is open	1413	05

Fault description	SPN	FMI
Firing sequence the 2nd cylinder injector drive circuit is open	1414	05
Firing sequence 3 cylinder injector drive circuit open	1415	05
Firing sequence The 4th cylinder injector drive circuit is open	1416	05
Fuel injection control module 1 (wiring harness) short-circuit fault	520214	03
Ignition sequence 1 cylinder injector harness short circuit (high or low end short circuit to power supply or ground)	1413	03
Ignition sequence 2nd cylinder injector harness short circuit (high or low end short circuit to power supply or ground)	1414	03
Firing sequence 3rd cylinder injector harness short circuit (high or low end short circuit to power or ground)	1415	03
Ignition sequence 4th cylinder injector harness short circuit (high or low end short circuit to power supply or ground)	1416	03
Firing sequence 1 cylinder harness low end to high end short circuit	1413	04
Firing sequence 2 cylinder harness low end to high end short circuit	1414	04
Firing sequence third cylinder harness low end to high end short circuit	1415	04
Firing sequence 4 cylinder harness low end to high end short circuit	1416	04
Ignition sequence cylinder 1 is missing an injector Fuel correction (IQA) code	1413	14
Ignition sequence cylinder 2 is missing the injector Fuel Correction (IQA) code	1414	14
Cylinder 3 of firing sequence is missing an injector Fuel correction (IQA) code	1415	14
Ignition sequence Cylinder 4 is missing an injector Fuel correction (IQA) code	1416	14
Idle off	00	00
The PTO switch voltage signal is too high. Procedure	976	03
The joint of MeUn of high pressure oil pump is loose	1442	02
The MeUn drive circuit of high pressure oil pump is open	1442	05
The fuel metering unit (MeUn) driver chip in the electronic control unit (ECU) is	1442	06
High pressure oil pump fuel metering unit (MeUn) drive circuit low-end short	1442	16
Low end of MeUn drive circuit is short circuit to ground	1442	18
The driving current of MeUn is too large	1442	03
The driving current of MeUn is too small	1442	04
MIL lamp (OBD lamp) drive circuit open	520219	05
The MIL lamp (OBD lamp) driver chip in the electronic control unit (ECU)	520219	06
MIL lamp (OBD lamp) drive circuit to the power short circuit	520219	03
MIL lamp (OBD lamp) drive circuit to the ground short circuit	520219	04
The PTO switching voltage signal is too low	976	04
Electronic control Unit (ECU) internal hardware and software low-level monitoring error (MoC)	520220	02
Electronic control Unit (ECU) internal hardware and software low-level monitoring error (MoC)	520220	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error (MoC)	520220	14
Electronic control Unit (ECU) internal hardware and software low-level monitoring error (MoC)	520221	11

Fault description	SPN	FMI
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520222	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520223	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	20
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	21
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	22
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	23
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	24
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	25
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	24
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	27
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520290	03
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520224	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520225	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520226	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520227	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520228	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520229	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520229	14
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520230	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	1108	16
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520231	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520232	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520276	11
Starter release condition does not match	520225	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520233	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520234	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520234	20
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520234	21
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520235	11
Electronic control Unit (ECU) internal hardware and software low-level monitoring error	520235	20
Primary relay disconnect premature failure	200116	07
Main relay stuck fault	3508	12
The PTO switching voltage signal is improperly faulty	976	19

Fault description	SPN	FMI
Electronic control unit (ECU) internal chip communication failure (response communication)	520238	11
Internal chip communication failure in electronic control unit (ECU) (low voltage)	520238	04
Internal chip communication failure in electronic control unit (ECU) (high voltage)	520238	03
Electronic control unit (ECU) internal chip communication failure (other reasons)	520238	14
Oil pressure alarm lamp drive circuit open	100	05
The oil pressure alarm lamp driver chip in the electronic control unit (ECU) is overheating	100	06
The driving circuit of the oil pressure alarm lamp is short circuit to the power supply	100	03
Oil pressure alarm lamp drive circuit short circuit to the ground	100	04
Oil pressure is too low	100	01
Oil pressure sensor signal is not reliable	100	02
The oil pressure sensor detected a pressure value higher than the upper limit	100	15
The oil pressure sensor is below the lower limit	100	17
Oil pressure signal from CAN bus is faulty	100	19
The oil pressure sensor voltage signal is above the upper limit	100	16
The oil pressure sensor voltage signal is above the upper limit	100	18
The oil temperature sensor signal is not reliable	175	15
Oil temperature sensor signal is not trusted (oil temperature is too high)	175	15
The oil temperature is above the upper limit	175	03
Oil temperature is below the lower limit	175	04
Oil temperature sensor voltage signal is higher than upper limit	175	03
The oil temperature sensor voltage signal is below the lower limit	175	04
Boost pressure sensor signal is not trusted (compared to atmospheric pressure sensor)	2631	08
The boost pressure sensor voltage signal is higher than the upper limit	2631	03
The boost pressure sensor voltage signal is below the lower limit	2631	04
Atmospheric pressure is above the upper limit	108	15
Atmospheric pressure is below the lower limit	108	17
Atmospheric pressure sensor voltage signal above upper limit	108	03
Atmospheric pressure sensor voltage signal below the lower limit	108	04
The reliability of the environmental pressure sensor is faulty	108	12
Torque oil conversion MAP non-monotonic fault indication	520240	13
The boost pressure sensor signal is unreasonable - too large	102	00
Boost pressure sensor signal is not reasonable - too small	102	01
The boost pressure sensor voltage signal is higher than the upper limit	102	03
The boost pressure sensor voltage signal is below the lower limit	102	04

Fault description	SPN	FMI
The pressure limiting valve (PRV) reaches the maximum allowable opening times	520241	11
The pressure limiting valve (PRV) is forced open due to increased pressure	520241	20
The pressure limiting valve (PRV) is forced open due to pressure fluctuations	520241	21
Pressure limiting valve (PRV) is opened	520241	14
Pressure limiting valve (PRV) is opened to check oil balance (indicative failure)	520241	22
Mean rail pressure beyond the expected error range (indicative failure)	520241	02
The pressure limiting valve (PRV) reaches the maximum allowable opening time	520241	00
Rail pressure positive deviation over (actual rail pressure below set value) limit (MeUn scheme)	520243	00
The set flow rate of the oil metering unit is larger than the maximum calculated theoretically	520243	07
The actual value of rail pressure is greater than the set value	520243	02
Excess rail pressure negative deviation (actual rail pressure above the set value) when the oil supply to the MeUn reaches the minimum set flow	520243	01
Actual rail pressure below minimum rail pressure (MeUn scheme)	520243	20
High rail pressure	520243	22
Actual rail pressure above maximum rail pressure (MeUn scheme)	520243	21
When Overrun (Overrun), the flow rate of the oil metering unit is too large	520243	23
In idle state, the flow rate of the fuel metering unit is too large	520243	24
Minimum rail pressure error reported	520540	02
The rail pressure sensor signal is intermittent	520243	25
Rail pressure sensor signal drift fault (high voltage)	157	15
Rail pressure sensor signal drift fault (low voltage)	157	17
After the pressure limiting valve PRV is opened, the rail pressure is too high	520265	00
Set fuel injection to be less than the nominal minimum possible (after pressure limiting valve PRV is opened)	520265	11
High fuel temperature (after pressure limiting valve PRV is opened)	520265	14
The rail pressure sensor voltage signal is higher than the upper limit	157	03
The rail voltage sensor voltage signal is lower than the lower limit	157	04
The PTO switch CAN signal is faulty	976	20
The gas pedal sensor 1 voltage signal is higher than the upper limit	91	03
The gas pedal sensor 2 voltage signal is higher than the upper limit	29	03
Remote gas pedal potentiometer 1 Voltage is higher than maximum	520277	03
Remote gas pedal potentiometer 2 Voltage is higher than maximum	520278	03
The gas pedal sensor 1 voltage signal is below the lower limit	91	04
The gas pedal sensor 2 voltage signal is below the lower limit	29	04
Remote gas pedal potentiometer 1 Voltage below minimum	520277	04
Remote gas pedal potentiometer 2 Voltage is higher than maximum	520278	04

Fault description	SPN	FMI
Sensor power module 1 is faulty	3509	02
Sensor power module 1 is faulty	3509	06
Sensor power module 1 is faulty	3509	04
Sensor power module 1 is faulty	3509	05
Sensor power module 2 is faulty	3510	02
Sensor power module 2 is faulty	3510	06
Sensor power module 2 is faulty	3510	04
Sensor power module 2 is faulty	3510	05
Sensor power module 3 is faulty	3511	02
Sensor power module 3 is faulty	3511	06
Sensor power module 3 is faulty	3511	04
Sensor power module 3 is faulty	3511	05
The Stop Lamp drive circuit is open	520279	05
The Stop Lamp driver chip in the electronic control unit (ECU) overheats	520279	06
The Stop Lamp drive circuit shorts the battery	520279	03
The Stop Lamp drive circuit is short circuited to the ground	520279	04
The starter Inhibit Configuration shorted the power supply	1675	10
Virtual launcher instructions	1675	11
The high-end driver chip of the starter relay control end in the electronic control unit (ECU) overheats	1675	06
The control end of the starter relay short-circuits the power supply	1675	03
Starter relay control end high end to ground short circuit	1675	04
The low-end driver chip of the starter relay control end in the electronic control unit (ECU) is overheating	1675	15
The control end of the starter relay is short circuited to the power supply	1675	13
The lower end of the control end of the starter relay is short circuited to the ground	1675	12
The starter relay control end is open	1675	05
The system light (SVS) drive circuit is open	520250	05
The system light (SVS) driver chip in the electronic control unit (ECU) is overheating	520250	06
The system light (SVS) drive circuit shorted the battery	520250	03
System light (SVS) drive circuit is short to ground	520250	04
ECU software reset _0	520251	11
ECU software reset _1	520251	20
ECU software reset _2	520251	21
Gas pedal 1 and gas pedal 2 signal reasonable failure	520252	02
Asynchronous failure of remote gas pedal potentiometers 1 and 2	520280	02
Fault description	SPN	FMI

Air flow meter (HFM) intake temperature sensor period signal is higher than the upper limit	172	15
Air flow meter (HFM) intake temperature sensor period signal below the lower limit	172	17
The air flow meter (HFM) intake temperature sensor voltage signal is higher than the upper limit	172	04
Air flow meter (HFM) intake temperature sensor voltage signal below the lower limit	172	03
The air temperature sensor is properly faulty	1172	12
The voltage signal of the intake air temperature sensor after supercharging and intercooling is higher than the upper limit	105	03
The voltage signal of the intake air temperature sensor after supercharging and intercooling is lower than the lower limit	105	04
Supercharger load limit	00	00
Engine protection torque limit	520269	14
Fuel injection system torque limit	520270	14
Overheat torque limit	520271	14
DPF torque limit	520197	11
Performance torque limit	520273	14
Smoke control limit torque	520274	14
Water temperature indicator drive circuit open	520137	05
The water temperature indicator driver chip in the electronic control unit (ECU) is overheating	520137	06
The water temperature indicator drive circuit shorted the power supply	520137	03
The driving circuit of the water temperature indicator is short circuit to the ground	520137	04
The voltage signal of the temperature sensor in the electronic control unit (ECU) is higher than the upper limit	520138	03
The voltage signal of the temperature sensor in the electronic control unit (ECU) is below the lower limit	520138	04
The reliability of the ECU temperature sensor is faulty	520138	02
Throttle valve (TVA) drive current limited	51	06
The self-learning deviation of the electronic throttle valve (TVA) at the full shutdown position exceeds the limit	51	17
The self-learning deviation of the electronic throttle valve (TVA) in the full open position exceeds the limit	51	15
The throttle valve (TVA) controller deviates during cold start	51	12
Throttle valve (TVA) controller produces permanent positive deviation	51	18
Throttle (TVA) controller produces permanent negative deviation	51	16
Throttle valve (TVA) valve H bridge drive open	3673	01
Throttle valve (TVA) valve H bridge drive current overload	3673	02
The H bridge drive chip of the throttle (TVA) valve in the electronic control unit (ECU) is overheating	3673	03
Throttle valve (TVA)H bridge drive circuit high-end short circuit to the power supply	3673	04
Throttle valve (TVA)H bridge drive circuit low end short circuit to the power supply	3673	05

Throttle valve (TVA)H bridge drive circuit high-end short circuit to ground	3673	06
Throttle valve (TVA)H bridge drive circuit low end to ground short circuit	3673	07
Throttle valve (TVA)H bridge drive circuit short-circuit overload	3673	08
Throttle valve (TVA)H bridge drive circuit The circuit is overheating	3673	09
Throttle valve (TVA)H bridge drive circuit low voltage	3673	10
The throttle valve (TVA) is stuck in the off position	51	01
Throttle valve (TVA) stuck in open position	51	00
Electronic throttle (TVA) signals exceed the mechanical maximum position	51	20
Electronic throttle (TVA) signals exceed the mechanical minimum position	51	21
TVA valve spring failure	51	07
Throttle valve (TVA) Position feedback sensor value above the upper limit (analog	51	13
Throttle valve (TVA) position feedback sensor value below lower limit (analog signal)	51	14
The throttle valve (TVA) is temporarily faulty	51	11
Supercharger overspeed fault	103	00
The speed signal from the CAN bus is faulty	1624	08
The speed signal from the CAN bus is faulty	84	08
The speed signal from the CAN bus is faulty	84	19
Speed above the limit	84	00
The speed signal is unreasonable	84	14
The speed signal is unreasonable	84	02
The voltage signal of the vehicle speed sensor is higher than the upper limit	84	03
The speed sensor voltage signal is below the lower limit	84	04
The PWM speed signal from the speedometer is above the upper limit	1624	03
The PWM speed signal from the speedometer is below the lower limit	1624	04
The PWM speed signal from the speedometer is faulty	1624	08

X1/X2/X3 engine failure code

unit	Trouble code	Fault definition	SPN	FMI	J1939 DTC
Atmospheric pressure sensor	P2229	short-circuit	108	3	0x0003006C
	P2228	Short circuit to earth	108	4	0x0004006C
Water temperature sensor	P0119	Signal untrustworthy	110	2	0x0002006E
	P0118	short-circuit	110	3	0x0003006E
	P0117	Short circuit to earth	110	4	0x0004006E
	P0128	The minimum value is not reached within the specified time	110	17	0x0011006E
	P0116	The startup temperature is too high	110	15	0x000F006E
Intake pressure sensor	P0238	short-circuit	102	3	0x00030066
	P0237	Short circuit to earth	102	4	0x00040066
Pressure dependent fault	P0069	The correlation between intake pressure and atmospheric pressure is therefore difficult	102	2	0x00020066
Oil-water separator	P2264	The water level sensor of the oil-water separator is abnormal	97	12	0x000C0061
Intake air temperature sensor	P0112	Upper limit of intake air temperature deviation	105	15	0x000F0069
	P0113	Lower limit of intake temperature deviation	105	17	0x00110069
Oil pressure sensor	P0522	Short circuit to earth	100	4	0x00040064
	P0523	short-circuit	100	3	0x00030064
	P0524	Low oil pressure	100	17	0x00110064
Oil temperature sensor	P0197	Short circuit to earth	175	4	0x000400AF
	P0198	short-circuit	175	3	0x000300AF
Hand throttle sensor 1	P0122	Short circuit to earth	91	4	0x0004005B
	P0123	short-circuit	91	3	0x0003005B
Hand throttle sensor 2	P0222	Short circuit to earth	29	4	0x0004001D
	P0223	short-circuit	29	3	0x0003001D
Throttle correlation fault	P2135	Manual throttle 1, 2 correlation failure	91	2	0x0002005B
Foot throttle sensor 1	P2122	Short circuit to earth	520243	4	0x00E4F033
	P2123	short-circuit	520243	3	0x00E3F033
Foot throttle sensor 2	P2127	Short circuit to earth	520244	4	0x00E4F034
	P2128	short-circuit	520244	3	0x00E3F034

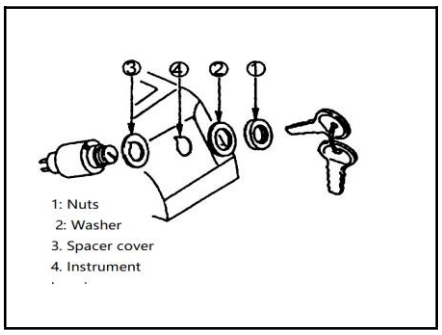
Foot throttle correlation failure	P2138	Foot throttle 1, 2 correlation failure	520243	2	0x00E2F033
Fuel actuator position sensor	P1117	Lower limit of position sensor offset	520190	17	0x00F1EFFE
	P1118	Position sensor offset upper limit	520190	15	0x00EFEFFE
	P1119	short-circuit	520190	3	0x00E3EFFE
	P1120	Short circuit to earth	520190	4	0x00E4EFFE
Fuel actuator	P1110	Open a way	520191	5	0x00E5EFFF
	P1111	overcurrent	520191	6	0x00E6EFFF
	P1113	Short circuit to earth	520191	4	0x00E4EFFF
	P1112	short-circuit	520191	3	0x00E3EFFF
	P1114	Upper limit of driving signal	520191	15	0x00EFEFFF
	P1116	Lower limit of drive signal	520191	17	0x00F1EFFF
Timing stroke sensor	P1157	Short circuit to earth	520192	4	0x00E4F000
	P1156	short-circuit	520192	3	0x00E3F000
Fuel temperature sensor	P0182	Short circuit to earth	174	4	0x000400AE
	P0183	short-circuit	174	3	0x000300AE
	P0181	Signal untrustworthy	174	11	0x000B00AE
Battery voltage	P0563	Overvoltage	168	3	0x000300A8
	P0562	Undervoltage	168	4	0x000400A8
Engine speed	P0726	The engine speed signal cannot be trusted	190	11	0x000B00BE
	P0727	The engine speed signal is missing	190	12	0x000C00BE
Sensor power supply 1	P0642	The reference voltage of the sensor is abnormal	3509	12	0x000C0DB5
Sensor power supply 2	P0652	The reference voltage of the sensor is abnormal	3510	12	0x000C0DB6
Sensor power supply 3	P0698	The reference voltage of the sensor is abnormal	3511	12	0x000C0DB7
Timing valve control	P1150	Open-circuit fault	520193	5	0x00E5F001
	P1151	Overcurrent	520193	6	0x00E6F001
	P1152	short-circuit	520193	3	0x00E3F001
	P1153	Short circuit to earth	520193	4	0x00E4F001
	P1154	The timing is small	520193	17	0x00F1F001
	P1155	The timing is too large	520193	15	0x00EFF001

Main relay	P0687	short-circuit	2634	3	0x00030A4A
	P0686	Short circuit to earth	2634	4	0x00040A4A

unit	Trouble code	Fault definition	SPN	FMI	J1939 DTC
Preheating relay	P0670	Open a way	729	5	0x000502D9
	P0384	short-circuit	729	3	0x000302D9
	P0383	Short circuit to earth	729	4	0x000402D9
	P1310	Excessive temperature	729	2	0x000202D9
Oil inlet solenoid valve	P0005	Open a way	520196	5	0x00E5F004
	P0006	Short circuit to earth	520196	4	0x00E4F004
	P0007	short-circuit	520196	3	0x00E3F004
Starting motor relay	P0617	short-circuit	677	3	0x000302A5
	P0616	Short circuit to earth	677	4	0x000402A5
Electronic oil pump control	P025C	Short circuit to earth	520194	4	0x00E4F002
	P025D	short-circuit	520194	3	0x00E3F002

Key (start) switch

1. Remove the combined instrument.
2. Disconnect the distribution connector.
3. Remove the nut, washer, spacer and instrument panel.
4, the installation and disassembly steps are opposite. Adjust the protruding part of the switch to the appropriate length during installation.



Inspect Use a multimeter (set to Ohm) to check that the key switch is on Whether each position is connected.

Switch position	terminal
OFF	Be blocked up
ON	B2-Acc passage
START	B2-Acc-C-R2 passage

Switch position terminal	OFF	ON	START
1（B2）		O	O
2（Acc）		O	O
3（C）			O
4（R2）			O

relay

type	Rated voltage	Rated load current	remark
Starting relay	12V	80A	Control the starter
Preheating relay	12V	80A	Control diesel cylinder
Time relay	12V	1.2A	Control plug heating

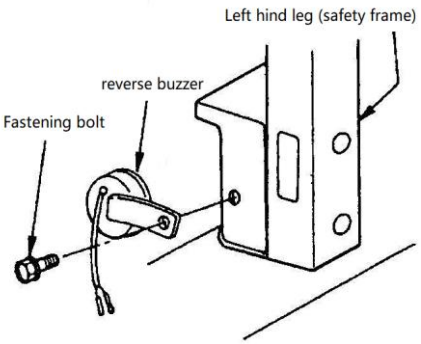
Instrument detection

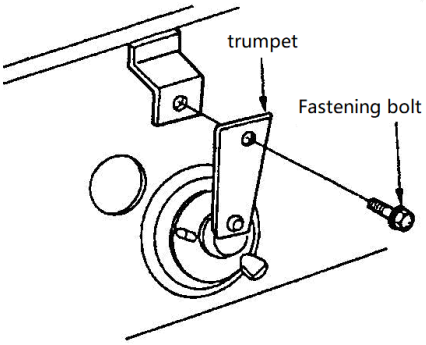
name	purpose	Scale range	Normal range	remark
Water thermometer	Indicates engine cooling water temperature	50℃-60℃ yellow 60℃-100℃ cyan	Blue band	Stop and check when the pointer points to the red belt
Fuel gauge	Indicates fuel storage capacity	0-1/10 red	Blue band	Oil should be added when the pointer approaches the red band
stopwatch	Cumulative engine hours			
Oil temperature gauge 	Indicates the oil temperature of the hydraulic transmission (before improvement)	50℃-60℃ yellow 60℃-100℃ cyan 100℃-120℃red	Blue band	Stop and check when the pointer points to the red belt

Alarm light detection

name	purpose	Light on (alarm)	Off (Normal)	remark
Charge alarm lamp	Indicates whether the generator voltage has reached the rated value and whether the battery has been charged	The generator is not generating or below its rating and is not charging	Generator working properly	When the voltage is established at idle, the lamp should be turned off
Oil pressure alarm light	Indicates whether the engine oil pressure meets the requirements, and the idle speed is ≥50kPa	Engine oil pressure is less than 50kPa	Normal oil pressure	When the voltage is established at idle, the lamp should be turned off
Preheating lamp	Indicates engine warm-up	That means the engine is warming up	Can start the engine	
Oil-water separation light				
Transmission oil temperature  alarm light	Indicating transmission oil temperature (modified)	The oil temperature exceeds 120℃	60℃-120℃	

If the alarm lamp bulb or alarm circuit in the combined instrument is faulty, even if the generator voltage lubricating oil pressure is not normal, the alarm lamp will not light, so the alarm circuit should be checked before the forklift is used. The instrument assembly is equipped with a check switch, press it, and the alarm light (except the far light indicator) will light up, indicating that the alarm circuit works normally.





The reverse buzzer

Disassembly and installation

1. Disconnect the wiring connector and remove the bolt.

2, the installation and disassembly steps are opposite.

trumpet

Disassembly and installation

1. Remove the connector of the horn connection.

2. Remove the bolts and horn.

Weight, tires and other attributes

peculiarity	Manufacturer (abbreviated)		Nobelift	Nobelift	Nobelift	Nobelift	Nobelift
	Nobelift type		CPC(D)20-AX1	CPC(D)25-AX1	CPC(D)30-N1X1	CPC(D)35-N1X1	CPC(D)38-N1X1
	Power mode: electric (battery or power supply), diesel, gasoline, gas, manual		Diesel	Diesel	Diesel	Diesel	Diesel
	Operation mode: manual, walking, standing, Seat driving type, picking		Seat driving type	Seat driving type	Seat driving type	Seat driving type	Seat driving type
	Rated load capacity	Q(kg)	2000	2500	3000	3500	3800
	Load center distance	C(mm)	500	500	500	500	500
	Front suspension distance	x(mm)	465	465	480	485	485
	spread of axles	y(mm)	1660	1660	1760	1760	1760
weight	weight	kg	3500	3800	4250	4560	4760
	Bridge load at full load, front / Rear	kg	4870/630	5600/730	6450/800	7200/860=	7600/960
	Bridge load at unload, front / Rear	kg	1600/1900	1600/2200	1750/2500	1760/2800	1760/3000
tyre	Tires: Solid rubber, superelastomer, air tire, polyurethane tire		Inflatable tire	Inflatable tire	Inflatable tire	Inflatable tire	Inflatable tire
	Front wheel specification		7.00-12-12PR	7.00-12-12PR	28x9-15-14PR	28x9-15-14PR	28x9-15-14PR
	Rear wheel specification		6.00-9-10PR	6.00-9-10PR	6.50-10-10PR	6.50-10-10PR	6.50-10-10PR
	Number of wheels, front / Rear (×= Driving wheel		2X/2	2X/2	2X/2	2X/2	2X/2
	Front wheel gauge	b10(mm)	973	973	1000	1000	1000
	The rear wheel base	b11(mm)	980	980	980	980	980
other	fitting Working pressure	Mpa	18.5	18.5	18.5	18.5	18.5
	fitting Working flow	L/min	60	60	70	70	70
	Tank capacity	L	60	60	70	70	70
	Driver's ear noise level, according to EN 12053	dB	30	30	98	98	98
	Traction pin specification DIN 15170		18.5	18.5	30	30	30

NOBLELIFT

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