ZOOMLION QY40V532 TRUCK CRANE

TECHNICAL SPECIFICATION

CHANGSHA ZOOMLION HEAVY INDUSTRY SCIENCE & TECHNOLOGY DEVELOMENT CO., LTD

QY40V532 TRUCK CRANE

TECHNICAL SPECIFICATION

1. Product characteristics

The QY40V532 truck crane, which is developed independently to adapt to the market demands, is a new-generation and high-performance product integrating our company many years' manufacturing experience with advanced technologies. Its performances such as lifting height, boom length, working speed and lifting capacity have achieved advanced international level.

The truck crane, with spacious cab and luxurious equipments, adopts full slewing system, telescopic boom, hydraulic proportional control system and self-made full-width special purpose chassis with four axles. 8×4 drive and hydraulic power steering mechanism provides the crane with good driving performance and flexible steering.

The system with latest load feedback hydraulic operated proportional directional control valve and quadruple gear pump, and the safety devices fitted in hydraulic system, such as relief valve, balance valve, hydraulic lock and brake valve etc., prevents the oil line from overloading and the accidents caused by oil pipe breakage to makes full use of the working capacity of each actuating mechanism. Thus the reliability and safety of the crane are increased.

The safety devices such as load moment limiter, and the complete lighting system equipped in the crane ensure your safety during operation and are convenient for night work.

This crane has a novel style which makes it beautiful in figure, in form and in color.

2. Complete vehicle specification

2.1 Product model

Model in auto industry: QY40V532

2.2 Main technical specifications

Item		Value	Remarks
Working performance specification	Max. rated total lifting capacity kg	40000	
	Max. load moment of basic boom kN.m	1430	
	Max. load moment with max. main boom length kN.m	800	
	Max. lifting height of basic boom m	12.0	Deformation of boom is not taken into consideration.
	Max. lifting height of main boom m	41.7	
	Max. lifting height of fly jib m	56.4	

Working speed	Max. speed of single rope on main winch m/min		130	The 4th layer of drum
	Max. speed of single rope on auxiliary winch m/min		80	The 2nd layer of drum
	Derricking time of boom s		40	
	Telescopic time of boom s		80	
	Slewing speed r/min		0~2.2	
Traveling specification	Max. traveling speed km/h		70	
	Max. gradeability %		30	
	Min. turning circle diameter m		24	
	Min. ground clearance mm		280	
	Limits for exhaust pollutants and smoke		Comply with related standards	GB3847-2005 GB17691 -2005 (Stage III)
	Oil consumption per hundred kilometers L		48	
Mass specification	Deadweight of crane in traveling condition kg		36900	
	Complete vehicle kerb mass kg		36870	
	Front axle load kg		13700	
	Rear axle load kg		24300	
Dimension specification	Overall dimensions (L×W×H) mm		13060×2750×3560	
	Base on outriggers m		5.6	
	Distance between outriggers m		6.90 (fully)	4.70 (half)
	Main boom length m		10.9~41.0	
	Main boom angle °		-2～80	
	Fly jib length m		9 ,15	
	Offset angle of fly jib °		0 , 30	
Chassis	Model		ZLJ5414	
	Class		II	
	Engine	Model	WP10.290	
		Rated power kW/r/min	213/2200	
		Max. output torque N.m/r/min	1160/1200～1600	
	Manufacturer		Changsha Zoomlion Heavy Industry Science & Technology Development Co., Ltd	

2.3 Rated lifting capacity table

表 2-1 单位：kg

Working radius (m)	Main boom (m)						
	Work in side & rear area with outriggers and telescoping cylinder I fully extended						
	10.9	14.7	18.5	24.1	29.7	35.3	41.0
3.0	40000	33000					
3.5	40000	33000	26000				
4.0	34500	30000	26000				
4.5	31000	28000	24500	18000			
5.0	28000	26000	22500	17500			
5.5	26000	24000	20800	17000	13500		
6.0	23500	22500	19300	16500	13000		
6.5	21500	21000	18000	15500	12500		
7.0	19500	19000	16900	14500	12000	10500	
7.5	17200	16500	15800	13500	11500	10500	
8.0	15300	15000	14600	12500	11000	10000	7800
9.0	12200	12000	11600	11500	10200	9500	7400
10.0		9900	9500	10400	9400	8500	7000
11.0		8200	7800	8800	8600	7500	6600
12.0		7000	6600	7600	8000	6900	6000
14.0			4600	5600	6000	6300	5400
16.0			3200	4200	4600	4900	5000
18.0				3100	3500	3900	4000
20.0				2200	2600	3000	3200
22.0					2000	2300	2500
24.0					1500	1800	2000
26.0					1100	1300	1500
28.0						1000	1200
30.0						700	900
32.0							600
I	0	3.8	7.6	7.6	7.6	7.6	7.6
II	0	0	0	5.6	11.2	16.8	22.5
Reeving	10	8	8	5	5	3	3
hook	40t main hook						

表 2-2 单位：kg

Working radius (m)	Main boom (m)					
	Work in side & rear area with outriggers and telescoping cylinder I 50% extended					
	10.9	14.7	20.3	25.9	31.5	37.2
3.0	40000	33000				
3.5	40000	33000				
4.0	34500	30000	18000			
4.5	31000	28000	18000			
5.0	28000	26000	17500	13500		
5.5	26000	24000	17000	13500		
6.0	23500	22500	16500	13000		
6.5	21500	21000	15500	12500	10500	
7.0	19500	19000	14500	12000	10500	
7.5	17200	16500	13500	11500	10500	7800
8.0	15300	15000	12500	11000	10000	7800
9.0	12200	12000	12000	10200	9500	7400
10.0		9900	10800	9400	8500	7000
11.0		8200	9200	9000	7500	6600
12.0		7000	7900	8300	6900	6000
14.0			5900	6300	6600	5400
16.0			4500	4900	5200	5000
18.0			3400	3800	4100	4300
20.0				3000	3300	3500
22.0				2300	2600	2800
24.0					2000	2200
26.0					1600	1800
28.0					1200	1400
30.0					900	1100
32.0						800
Ⅰ	0	3.8	3.8	3.8	3.8	3.8
Ⅱ	0	0	5.6	11.2	16.8	22.5
Reeving	10	8	5	5	3	3
hook	40t main hook					

表 2-3 单位：kg

Working radius (m)	Main boom (m)				
	Work in side & rear area with outriggers and telescoping cylinder I 0% extended				
	10.9	16.5	22.1	27.7	33.4
3.0	40000	18000			
3.5	40000	18000			
4.0	34500	18000			
4.5	31000	18000	13500		
5.0	28000	18000	13500		
5.5	26000	18000	13500	10500	
6.0	23500	17500	13500	10500	
6.5	21500	16500	13000	10500	
7.0	19500	15500	12500	10500	7800
7.5	17200	14500	12000	10500	7800
8.0	15300	13500	11500	10000	7800
9.0	12200	12500	11000	9500	7400
10.0		11400	10000	8500	7000
11.0		9600	9500	7500	6600
12.0		8300	8700	6900	6000
14.0		6300	6700	6600	5200
16.0			5300	5500	4500
18.0			4200	4400	4000
20.0			3300	3600	3600
22.0				2900	3100
24.0				2300	2500
26.0					2100
28.0					1700
30.0					1400
32.0					
Ⅰ	0	0	0	0	0
Ⅱ	0	5.6	11.2	16.8	22.5
Reevings	10	5	5	3	3
Hook	40t main hook				

表 2-4 单位：kg

Working radius (m)	Main boom (m)						
	Work in side & rear area with outriggers half extended and telescoping cylinder I fully						
	10.9	14.7	18.5	24.1	29.7	35.3	41.0
3.0	40000	33000					
3.5	36000	30000	26000				
4.0	32000	27000	24000				
4.5	27000	24000	22000	18000			
5.0	22500	21500	20000	17500			
5.5	18400	17800	17000	17000	13500		
6.0	15300	14700	14000	15000	13000		
6.5	13000	12500	12000	13000	12500		
7.0	11200	10800	10500	11300	11500	10500	
7.5	9700	9300	9000	9800	10000	10000	
8.0	8600	8200	7900	8600	9000	9500	
9.0	6700	6300	6000	6700	7100	7500	7500
10.0		4900	4600	5300	5700	6100	7000
11.0		3800	3600	4300	4700	5100	6500
12.0		3000	2800	3500	3900	4300	5500
14.0			1500	2300	2600	2900	4600
16.0				1400	1700	2000	3200
18.0				700	1100	1400	2300
20.0					600	900	1100
22.0							700
24.0							
26.0							
Ⅰ	0	3.8	7.6	7.6	7.6	7.6	7.6
Ⅱ	0	0	0	5.6	11.2	16.8	22.5
Reevings	10	8	8	5	5	3	3
Hook	40t main hook						

表 2-5 单位：kg

Working radius (m)	Boom (m)					
	Work in side & rear area with outriggers half extended and telescoping cylinder I 50% extended					
	10.9	14.7	20.3	25.9	31.5	37.2
3.0	40000	33000				
3.5	36000	30000				
4.0	32000	27000	18000			
4.5	27000	24000	18000			
5.0	22500	21500	17500	13500		
5.5	18400	17800	17000	13500		
6.0	15300	14700	15500	13000		
6.5	13000	12500	13500	12500	10500	
7.0	11200	10800	11700	11500	10500	
7.5	9700	9300	10200	10500	10000	7500
8.0	8600	8200	9000	9500	9500	7500
9.0	6700	6300	7100	7600	8000	7000
10.0		4900	5600	6100	6500	6700
11.0		3800	4600	5100	5500	5800
12.0		3000	3800	4200	4600	4900
14.0			2600	2900	3200	3500
16.0			1700	2000	2300	2500
18.0				1400	1700	1900
20.0				900	1100	1300
22.0					700	900
24.0						600
26.0						
Ⅰ	0	3.8	3.8	3.8	3.8	3.8
Ⅱ	0	0	5.6	11.2	16.8	22.5
Reevings	10	8	5	5	3	3
Hook	40t main hook					

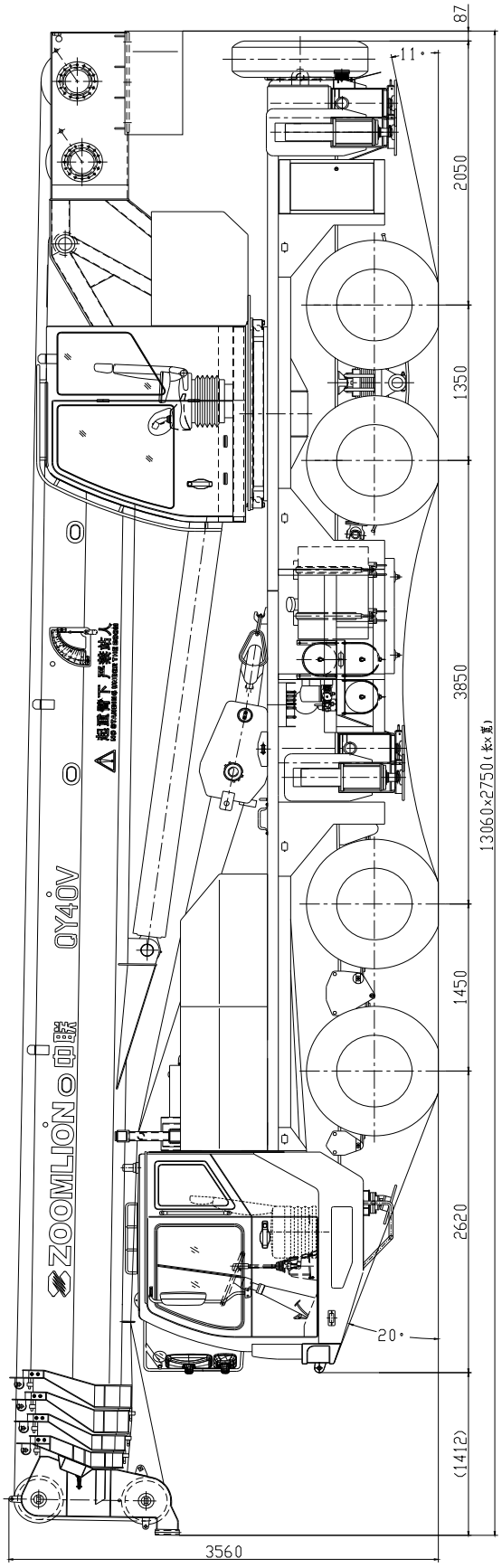
表 2-6 单位：kg

Working radius (m)	Boom (m)				
	Work in side & rear area with outriggers half extended and telescoping cylinder I 0% extended				
	10.9	16.5	22.1	27.7	33.4
3.0	40000	18000			
3.5	36000	18000			
4.0	32000	18000			
4.5	27000	18000	13500		
5.0	22500	17500	13500		
5.5	18400	17000	13500	10500	
6.0	15300	16000	13000	10500	
6.5	13000	14000	12500	10500	
7.0	11200	12200	11500	10500	7500
7.5	9700	10700	11000	10000	7500
8.0	8600	9500	10000	9500	7500
9.0	6700	7500	8000	8000	7000
10.0		6000	6400	6700	6700
11.0		5000	5400	5700	6100
12.0		4100	4500	4800	5200
14.0		2900	3200	3500	3800
16.0			2300	2500	2800
18.0			1700	1900	2200
20.0				1300	1600
22.0				900	1200
24.0					900
26.0					600
Ⅰ	0	0	0	0	0
Ⅱ	0	5.6	11.2	16.8	22.5
Reevings	10	5	5	3	3
Hook	40t main hook				

表 2-7 单位：kg

Boom angle	Boom + Jib (m)			
	Work in side & rear area with outriggers fully extended			
	41.0＋9.0		41.0＋15.0	
	0°	30°	0°	30°
80°	4000	2500	2500	1100
78°	4000	2500	2350	1050
76°	4000	2400	2200	1000
74°	3800	2300	2020	950
72°	3500	2200	1820	910
70°	3200	2120	1660	870
68°	2800	2000	1540	840
66°	2400	1750	1430	820
64°	2050	1450	1330	780
62°	1700	1200	1150	740
60°	1420	1000	900	680
58°	1180	850	750	550
56°	960	700	600	400
54°	780	550	450	
52°	600	450		
Reevings	1			
Hook	4.5t auxiliary hook			

2.4 Overall view



3 Specifications, superstructure

3.1 Boom and telescoping mechanism

The boom consists of 5 hexagon-section box-type boom sections which are made of high-strength low alloy steel, so it has strong bending resistance, great load bearing capacity, light deadweight, large lateral stiffness and small end deflection. Adopting a self-created support structure for sliding block angle, the deadweight of the boom has been greatly decreased and the stress on the boom is distributed more evenly after a series improvements. Thus, boom deformation caused by uneven stress distribution will never occur. Furthermore, the boom has good guidance quality and adjustability.

The boom telescoping mechanism is composed of two telescoping cylinders and two synchronous telescoping mechanisms. The 1st telescoping cylinder drives the 2nd boom section to telescope in / out; the 2nd telescoping cylinder drives the 3rd, 4th, 5th boom section to telescope in/out via the synchronous telescoping mechanism. This compact design makes the crane operate reliably. Each cylinder is fitted with a balance valve.

3.2 Jib

It consists of two jib sections. It is folded on the side of boom and fixed by inserting pins when it is not used. The 1st reduced lattice jib section has good load bearing capacity and the stress on it is well distributed; the 2nd jib section is in box type which can be pulled out from the 1st jib section. The jib length can be 9 m or 15m. The 1st jib section is mounted on the top boom section and its offset is 0° or 30°. The offset is conveniently changed by operating the shaft and pull bracket.

3.3 Slewing table

Single ribbed plate structured and optimized slewing table made from high-strength steel makes the layout of articulated points of boom and derricking mechanism more reasonable. It also has a unique structure and beautiful appearance. The engine hood is designed ergonomically. The inserting pin mechanism installed in the front of slewing table can prevent the superstructure from rotating during traveling.

3.4 Boom head single pulley

The boom head single pulley is mounted on the side of boom head when it is not used. It rotates around the shaft and aligns and then is fixed on the boom head by shaft. This option is set up for rapid hoists over the boom head to improve the working efficiency when the loads are light.

3.5 Derricking mechanism

1 front-mounted telescoping cylinder with a balance valve raises and lowers the boom from -2° to 80° smoothly.

3.6 Slewing mechanism

Axial plunger piston hydraulic motor drives the pinion on output shaft via the planetary gear reducer to rotate around the slewing ring, providing crane superstructure 360° unlimited rotation. The slewing mechanism is of controllable and free slewing function, which makes the load stop at any position. Slewing cushion valve and normally closed brake provide the crane with stable and reliable slewing. 4-point ball type slewing ring makes the slewing table of super-strong bearing capability and long service life.

3.7 Hoisting mechanism

It consists of main and auxiliary winch mechanisms. The axial plunger hydraulic motor drives the grooved drum via the planetary gear reducer to lift and lower the hook. There is a brake mounted between the motor and reducer. The main winch and auxiliary winch can work independently or simultaneously. The models of main / auxiliary winch reducer are the same. However, the main winch is driven by variable motor and auxiliary winch is driven by fixed displacement motor. A spring-type rope guard is installed on each winch. The main winch is also equipped with a lowering limit switch. The built-in two-stage planetary gear reducer has such advantages as compact design, light deadweight and high reliability. The hoist rope is anti-twisting and of high-strength and its specifications are as following:

Diameter: Φ17.0mm

Strength grade: 1960N/mm^2

Length: main hoist rope: 190m

auxiliary hoist rope: 120m

3.8 Main and auxiliary hook

The lifting capacity of main hook is 50t. The wire rope is reeved on the pulley block for 6 times. The main hook is rotatable and is equipped with a hook safety device and the mounting lugs for fixing the tail end of wire rope. The lifting capacity of auxiliary hook is 4.5t and the wire rope is reeved on the pulley for 1 time. The auxiliary hook is equipped with anti-rotating device and a hook safety device.

3.9 Operator's cab

Wide-vision operator's cab with adjustable headrest seat is made of steel. All the instrument panels are installed in front of the seat, and the control levers are beside the left and right armrest. The spacious, comfortable and safe cab, which is equipped with wiper, washer, A/C and heater, is ergonomically designed.

3.10 Outrigger

The crane adopts H-type outriggers. The outrigger box and sliding beam, which are made of low-alloy and high-strength steel, are of box structure. After CAD simulation design and actual-use calculation, the section of the outrigger is of good performance and the strong bearing capacity. The horizontal sliding beam can be telescoped in /out via the horizontal cylinder. Large outrigger span ensures the stability of the crane. The outrigger pad is mounted on the head of vertical cylinder and can be pushed and pulled horizontally. When the outriggers are fully extended or fully retracted, they are fixed by locking pins. The outrigger control levers are installed on both sides of chassis frame and can be operated synchronously or independently. Each vertical cylinder is equipped with a two-way hydraulic lock to ensure stable and reliable operation of the crane.

The 5^{th} outrigger is installed beneath the driver's cab. When the 5^{th} outrigger is set up, the

crane can realize all-direction slewing operation.

3.11 Hydraulic system

It is an open type hydraulic system. The advanced hydraulic proportional pilot lever control system and the hydraulic proportional control system are used to control the slewing, telescoping, derricking and hoisting mechanisms individually. Adopting the anti-pollution bite-type fitting ensures the high reliability of the hydraulic system. The quadruple gear pump is the main power supply device. Among the four pumps, two pumps are used for the main and auxiliary hoisting mechanism, telescoping mechanism and derricking mechanism together; the other one is used for the hydraulic system, slewing mechanism and A/C; the smallest pump supplies stable oil for the control levers. The chassis hydraulic system controls the moving direction of the horizontal cylinders and vertical cylinders by manual multiple directional control valve. The new multiple directional control valve with an additional pressure limit valve can effectively prevent piston rod of the horizontal cylinder from bending.

The outrigger control valve is manual multiple directional control valve which controls the outrigger control mechanism on both sides of chassis frame to control the outriggers telescoping synchronously or independently.

3.12 Electrical system

This is a single wire system with negative earthed. Its rated voltage is DC 24V. The superstructure electric includes the superstructure power control light, superstructure start control light, superstructure shutdown control light, overwinding control light, overlowering control light, overpressure control light, hoisting limit switch, lowering limit switch, overload warning device, lighting lamps, fan, wiper, horn and hydraulic oil cooling fan as well as A/C and so on. All the above devices ensure the safety operation and good working environment of the crane.

Press the red emergency stop button in an emergency, then the power supply of the vehicle will be cut off and the safety of the vehicle can be ensured.

3.13 Safety devices

The crane is equipped with an automatic load moment limiter whose display and warning

device is fitted in the operator's cab. If the actual load reaches 90% of the rated one, the warning light lights up and buzzer sends out slow acoustic warning. If the actual load approaches 100% of the rated one, all dangerous crane movements are switched off. According to the requirements, the digital LCD will display the following data: load moment ratio, boom angle, boom length, working radius, actual lifting capacity, permitted lifting capacity and the maximum permitted lifting height.

In addition, the crane is also equipped with the following safety devices to ensure the safety of the crane:

1) Boom angle indicator;

2) Suspended hoisting limit switch;

3) Hook safety device;

4) Lowering limit switch;

5) The 5^{th} outrigger overpressure protection device;

6) Two-way hydraulic lock;

7) Balance valve;

8) Relief valve.

3.14 A/C system, heater

Both the driver's cab and the operator's cab are equipped with an A/C special for auto.

The operator's cab is also equipped with a heater.

4. Specification of special purpose chassis for truck crane

For detailed information, please refer to *Technical Specification for Special Purpose Chassis*.

ZOOMLION ZLJ5414V SPECIAL PURPOSE CHASSIS

TECHNICAL SPECIFICATION

ZLJ5414V3.7/27Y

1. Product characteristic

ZLJ5414V special purpose chassis for truck crane, integrating many years' design and manufacturing experience and different kinds of high-tech, is a new generation product with high performances, developed independently by our company in accordance with market trend and consumers' demands. The chassis is designed, manufactured and tested strictly in accordance with the requirements stipulated in national standard and industrial standard. Emission of the crane complies with the regulations of GB17691-2005 National Stage Ⅲ and GB3847-2005, and safety devices conform to the requirements of 3C certification.

This truck crane adopts a low-mounted full-width driver's cab developed by our company and made by a professional vehicle body manufacturer, which has original and unique appearance and has good aerodynamic quality in the complete vehicle form. The design of interior trimming and the layout of each switch, signal lamp, control lever and pedal are according to the ergonomical aspects for comfortable and convenient operation. The electronically controlled engine is more energy-saving and environmental-friendly. The control system adopts the CAN bus technology with engine self-diagnosis function. The 8×4 drive type makes the crane have good driving performance. The hydraulic power steering system makes steering of the crane easy and flexible. The double-circuit air brake system ensures reliable working of the brake system.

The optional emergency steering system is functioned as emergency steering and towing of the vehicle to ensure the safety traveling.

Maintenance cost and convenience for customers have been fully taken into consideration in our original design concept. Therefore, each instrument in the driver's cab is independent, and most of the connecting elements of each pneumatic circuit and oil circuit are components conforming to industrial standard.

2. Chassis specification

2.1 Product Model

Model in auto industry: ZLJ5414V

Code: ZLJ5414V3.7

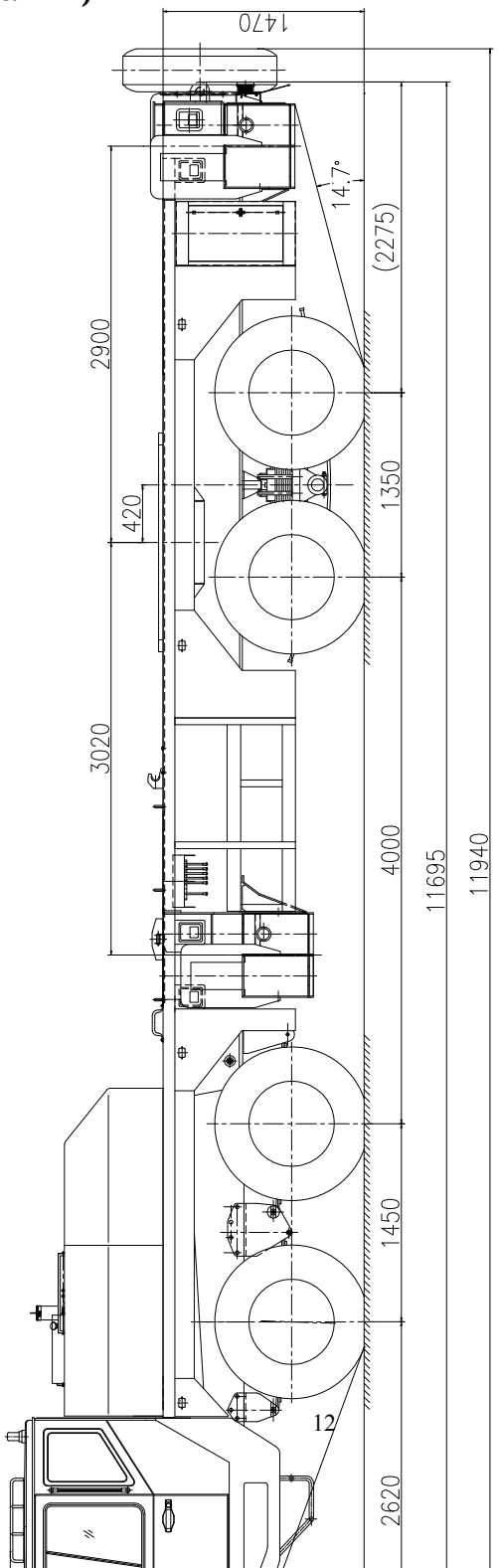
2.2 Main Technical Specifications

Item		Value	Remarks
Mass	Max. design total mass kg	41000	
	Max. design axle load (front/rear) kg	7500 / 7500 / 26000 (tandem axles)	
	Complete vehicle kerb mass kg	15500	
	Axle load (front/rear) kg	3720 / 3720/ 8060 (tandem axles)	
Traveling	Max. traveling speed km/h	76	
	Max. gradeability %	30	
	Min. turning diameter m	≤24	
	Min. ground clearance mm	280	
	Approach angle/ departure angle °	20/ 14.7	
	Braking distance m	≤10	Initial speed: 30km/h
	Limit for exhaust pollutants and smoke	Conform to standard regulations	GB3847-2005 GB17691-2005 (National Stage Ⅲ)
	Oil consumption per hundred kilometers L	48	
	Fuel tank L	300	

Dimension	Overall dimension (L×W×H) mm		11695×2750×2587	
	Front suspension / Rear suspension mm		2620 / 2275	
	Axle number		4	
	Wheel base mm		1450+4000+1350	
	Tread	Front mm	2220 / 2220	
		Rear mm	2055 / 2055	
Drive axle	Drive type		8×4	
	Speed ratio		5.73	
Number of leaf spring strip (front / rear)			11/11/10	
Tire	Specification		12.00-20 (18 layers)	Optional 12.00R20 (18 layers)
	Number (excluding spare tire)		12	
Engine	Model		WP10.336	
	Type		6-cylinder in line , turbo-charged, intercooling	
	Fuel type		Light diesel oil	
	Displacement ml		9726	
	Rated power / rotational speed kW/r/min		247/ 2200	
	Max. torque / rotational speed N • m/r/min		1250 / 1200～1600	
Transmission	Model		9JS150T-B	
	Type		Mechanical stepped gearshift transmission	
	Control type		Mechanical manual control	
	Number of gear		9 forward gears, 1 reverse gear	

	Speed ratio		Forward gear: 12.65 / 8.38 /6.22 / 4.57 / 3.40 /2.46 / 1.83 / 1.34 /1.00 Reverse gear:13.22	
The number of persons allowed in the driver's cab			2	
Steering system	Steering type		Steering wheel	
	Outer diameter of steering wheel mm		480	
	Steering column		Universal coupling	
	Steering gear	Model	PY-ZJ120C-Z/Y	
		Type	Integrated recirculating ball hydraulically booster steering gear	
	Steering oil pump	Model	QC32/13-WP-PY	Ordering No.:PY32004
		Type	Gear type	

2.3 Overall View (Unit: mm)



3. Specification for Chassis Main Components

3.1 Engine

This engine adopts special engine under special operating conditions for truck crane, which has larger output torque, excellence starting performance and quick acceleration while complete vehicle starting. The forced-induction system can usefully ensure engine has larger torque at low-speed running, obviously upgrade its low-speed dynamic property and strengthen gradeability of complete vehicle. Meanwhile, availably prolong service life of complete vehicle under low-speed operating conditions when emission temperature is relatively low. The electrical fuel injection system can save energy and protect environment.

3.2 Clutch and Its Controls

The diameter of friction lining is Φ 430mm.

The crane adopts clutch system of single dry plates, which work performance is steady, pedal effort that thorough separation needed is small.

The clutch control adopts air-assisted hydraulic control mechanism, which controls expediently and reliably. Driver only increases clutch pedal travel to get enough hydraulic pressure and carry out clutch's separation even if air-assisted system is out of control (Caution: needed pedal force

will be increase greatly at this moment).

3.3 Transmission and Its Controls

The crane adopts mechanical nine shifts transmission, which has nine forward gears and one reverse gear. The transmission is made up of a main section and a rear mounted auxiliary section, which adopt two intermediate shafts of the same structure. The power is inputted from input shaft, and then branches into two intermediate shafts, collects to output of main shaft at last. This structure not only reduces the thickness of gear, shorten the axial dimension of transmission, lighten the mass of complete vehicle, but also make main shaft structure more simple, make it bear toque and not bear bending moment, which improves the force conditions of main shaft and bearing, greatly enhance service reliability and endurance of transmission. The transmission has many gears and its difference of speed ratio between each gear is small, therefore the rotational speed difference between neighbouring gears is small during operation to make shift steady.

The full-synchronizer is installed on the transmission, and the shift cylinder is controlled by the high/low changeover switch of its gearshift control lever. The transmission can operate only when transmission changing from high gear to low gear or from low gear to high gear.

The control system adopts mechanical manual control structure, which simple in structure, convenient in maintenance and reliable in operation.

The end face tooth type of output flange of transmission makes the power transition more stable and reliable.

3.4 PTO

Rated output torque: 686N．m.

Output type: connect the flange, the rotary direction of output flange is the same as that of engine.

The rear mounted PTO is installed on extended intermediate shaft of auxiliary tank of transmission's rear end. Its power is taken out from extended intermediate shaft of transmission by PTO hollow shaft, and then transferred through engagement sleeve to input gear, output gear wheel shaft and output flange, and the power is transferred at last. This type of PTO has larger power.

It adopts two-way electro-pneumatic control, which can availably avoid accidence caused by the vehicle is in work state by mistake due to vibration and other reasons while the PTO is out of service.

3.5 Propeller Shaft

It adopts propeller shaft assembly of steyr series, which are all open end face teeth.

The rear end of the 1st propeller shaft is installed a intermediate support, which satisfies the arrangement need of propeller shaft, at the same time, minishes the angle of universal joint, heightens critical rotational speed and ameliorates resonance characteristic of drive system. The 2nd propeller shaft assembly's structure is similar to that of intermediate/rear axial propeller shaft assembly. There is universal joint at both ends and telescopic spline at intermediate part in order to adapts the axle hopping.

3.6 Axle

Front axles 1, 2 are steering driven axles, intermediate axles are through rigid drive axle, and the rear axle is ordinary rigid drive axle. The intermediate axles are with the longitudinal differential locking device, and intermediate and rear axles are all with the transversal differential locking device. All the axles are connected with the chassis frame via suspension.

The steering knuckle of the front axle is in integral forged fork structure, on which limit screws are installed, in order to limit and adjust inner and outer angular of the wheel and to fulfill the requirements of correct steering.

The connecting flange of intermediate/rear axles are end face teeth type; the double main reducer of axle assembly greatly enhances dynamic and economic performances of the complete vehicle.

3.7 Wheels and Tire

Tire model: 12.00-20-18PR;

Tire pressure: single tire 0.81MPa, double tire 0.74MPa;

Rim model: 660-31020-000;

The flat base wide rim can effectively prolong the service life of tires and improve vehicle trafficability and traveling stability.

The diagonal tire has such advantages as large elasticity, good abrasion resistance, small rolling resistance, good adhesive performance, good cushioning performance, large loading capacity and good anti-piercing performance.

3.8 Steering System

The steering system consists of an integral recirculating ball power steering gear, one outboard booster cylinder, steering oil pump and steering wheel, etc.

The steering gear adopts built-in booster cylinder, recirculating ball cog rack and gear segment steering mechanism and high sensitivity distributing valve, and it has such advantages as larger output torque, good alignability, safe and reliable operation and simple assembly and convenient maintenance.

The emergency steering system is optional. The main steering system works in normal working condition via the main steering pump taking off power from the engine. And the main steering system cannot work if the main steering pump cannot take off power from the engine. In this time, the emergency steering system can work via emergency steering pump taking off power from transmission. (Note: the emergency steering pump only takes off power from transmission when the vehicle is in traveling condition).

3.9 Suspension

The front suspension adopts the longitudinally-mounted leaf spring suspension system which has such advantages as simple structure, high working reliability, and convenient maintenance. The rubber buffer block installed on the leaf spring can touch the limit block on the aerofoil of the chassis frame to avoid leaf spring being damaged and to realize cushion function when the vehicle is traveling on the off-road or is impacted.

The rear suspension adopts twin axle balanced suspension of leaf spring, balance beam and thrust rod, among which rear leaf spring is fixed on bracket of balance beam by stud platen,

balance beam and thrust rod are connected in series. The vehicle doesn't appear skidding phenomenon even if it travels on uneven ground due to this structure has large absorbability when rear axle is distorted. The rubber block and limit block installed on rear leaf spring for protection.

3.10 Brake System

It consists of driving brake (foot brake), emergency brake (hand brake). Emergency brake can be selected to park the vehicle in normal conditions and on slopes.

Main brake: dual-circuit air pressure brake, acting on all wheel hubs;

Parking / Emergency brake: spring brake, acting on wheel hubs of intermediate/rear axle;

Auxiliary brake: engine exhaust brake.

When one of the pipelines in the dual-circuit brake pipeline is out-of-service, the other pipeline can still work normally, in this way, working reliability is greatly improved. If emergency brake is required when the service brake is ineffective or if there is no time to depress the brake pedal during traveling, apply the parking brake to exhaust the parking brake chamber and the brake spring is expanded immediately, as a result, the vehicle is braked and traveling safety is ensured.

The brake system adopts brake elements as the highly integrated solenoid valve island, four-circuit protection valve and dryer, etc. to make piping layout and maintenance easier and much more convenient.

3.11 Electrical System

This chassis adopts the two 6-QA-195 (N200) batteries connected in series (12V for each). The

electrical system adopts single wire system and takes metal (negative pole) as its return circuit and earths negative pole through battery master switch to form 24V output voltage. The battery conforms to standard GB/T5008.1-2005 "*Technical conditions and test methods of lead acid battery for the crane*" and its lead meets the National Standard QC/T29106-2004.

The standard generator is the integrated pressure regulating alternator; its output power is 2KW.

It adopts combination lamp, front and rear fog lamps, which make the vehicle artistic and improve traveling safety.

Instrument panel in the driver's cab adopts background lamp with gauges, which is convenient for operation at night and in bad weather, and facilitate maintenance. All connectors of electrical components are imported for reliable link and to reduce cost.

3.12 Driver's Cab

The low-mounted full-width cab is all metal welded and is fully covered with soft interior trimming of sound-damping and heat-insulating materials. There is a sun visor in the driver's cab. The seats of the driver and passenger are adjustable shock-absorbing high-back seat with safety belt. The steering wheel and power windows on both sides can be adjusted. The vibration-absorptive material which is sticked near the engine can effectively reduce the noise in driver's cab. The door is inside hinged with the driver's cab and the doorframe is equipped with rubber sealing strip to make the door has good tightness. The door can be opened with an angle of 85° to make the driver/passenger get in or out conveniently.

The front windshield in the driver's cab is installed with large parallel electric wiper with windshield washer and the large combination view mirror is installed on both sides, which make

the cab have elegant appearance, spacious space and good aerodynamics characteristic.

3.13 Air Conditioning

It is installed with adjustable heating / defogging device and air conditioning.