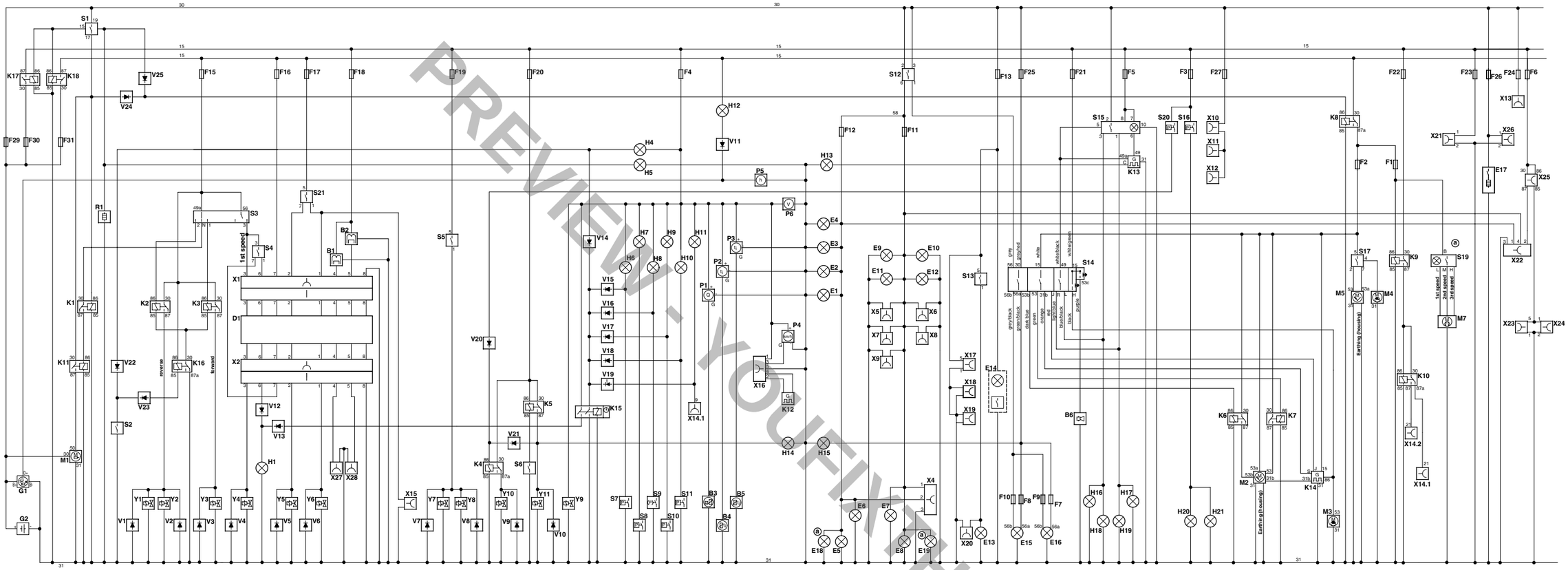
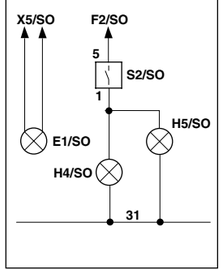
STANDARD EQUIPMENT

1 Power supply	2 Starting and drive system	3 Telltales and indicators (multi-instrument)	4 Lighting	5 Signalling system	6 Wiping system	7 Cooling/heatng	8 Other consumers

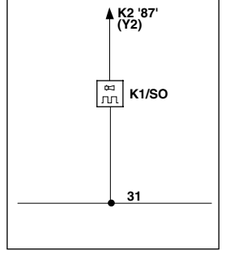


OPTIONAL EQUIPMENT

1 01206-17 (Rotating beacon)

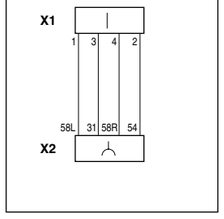


2 01262-01 (Backup warning system)



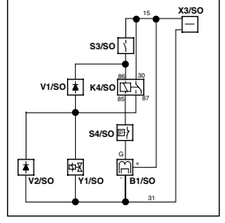
3 Mounting kit for attachment of front-end implements 38 000 03 30

- Connection to X22 in electrical diagram 39 001 00 90



4 049 360 00 98 (Bucket repositioning)

- Connection to X21 in electrical diagram 39 001 00 90



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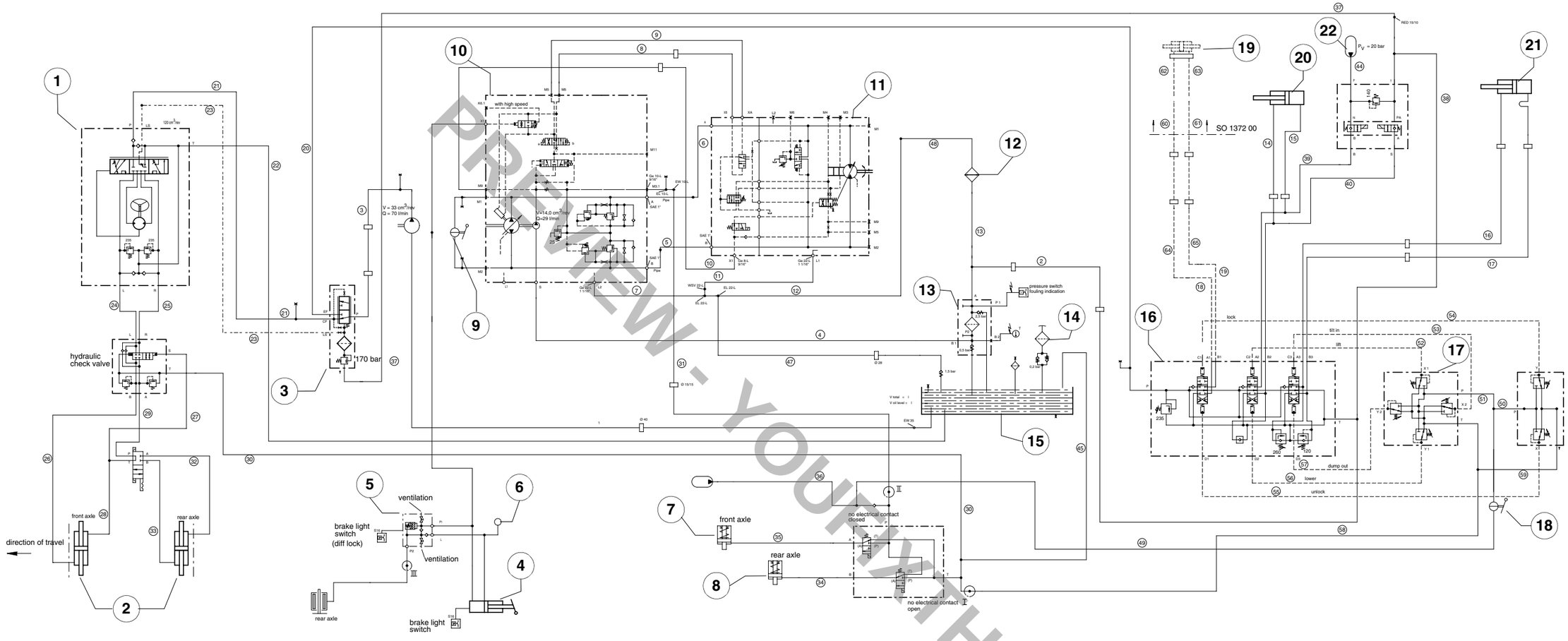
33.8 Electrical diagram models 303 58/304 59

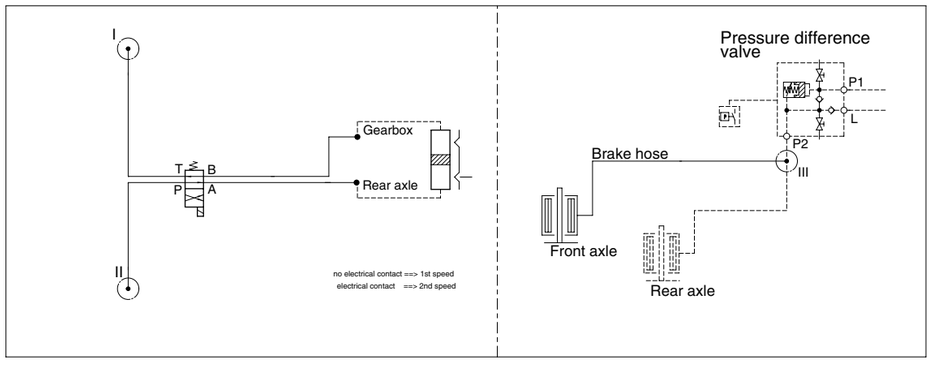
valid starting serial no.: 303 58 0001 to 303 58 0277
and: 304 59 0001 to 304 59 0157

39 001 00 90/a 04.95 and 38 001 01 90/a 03.96

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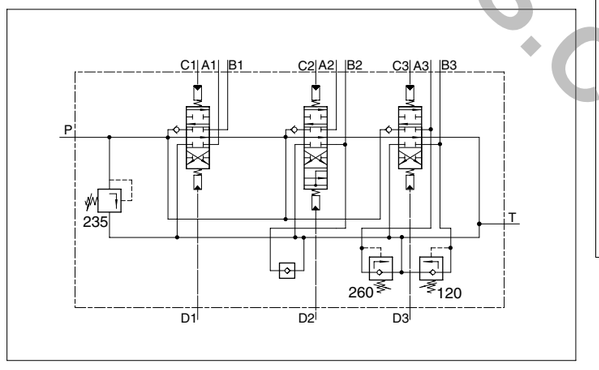
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SO 1393/12
SO 1393/13

SO 1367/03 (520)
SO 1367/05 (620)



SO 1393/11
SO 1393/13

Figure/SO no.	Description
1	Steering (servostat)
2	Steering ram
3	Priority valve
4	Master brake cylinder
5	Pressure difference valve
6	Expansion tank
7	Front axle differential lock
8	Rear axle differential lock
9	Tow away facility
10	Variable displacement pump – drive (90P055)
11	Variable displacement motor – drive (51D110)

Figure/SO no.	Description
12	Combinded oil/water cooler
13	Reflux filter for hydraulic oil
14	Ventilation for hydraulic oil tank
15	Hydraulic oil tank
16	Control valve for loader unit
17	Pilot control element
18	Lock for long-haul travel
19	Control ram on quickhitch facility
20	Lift ram
21	Tilt ram
22	Load stabilizer

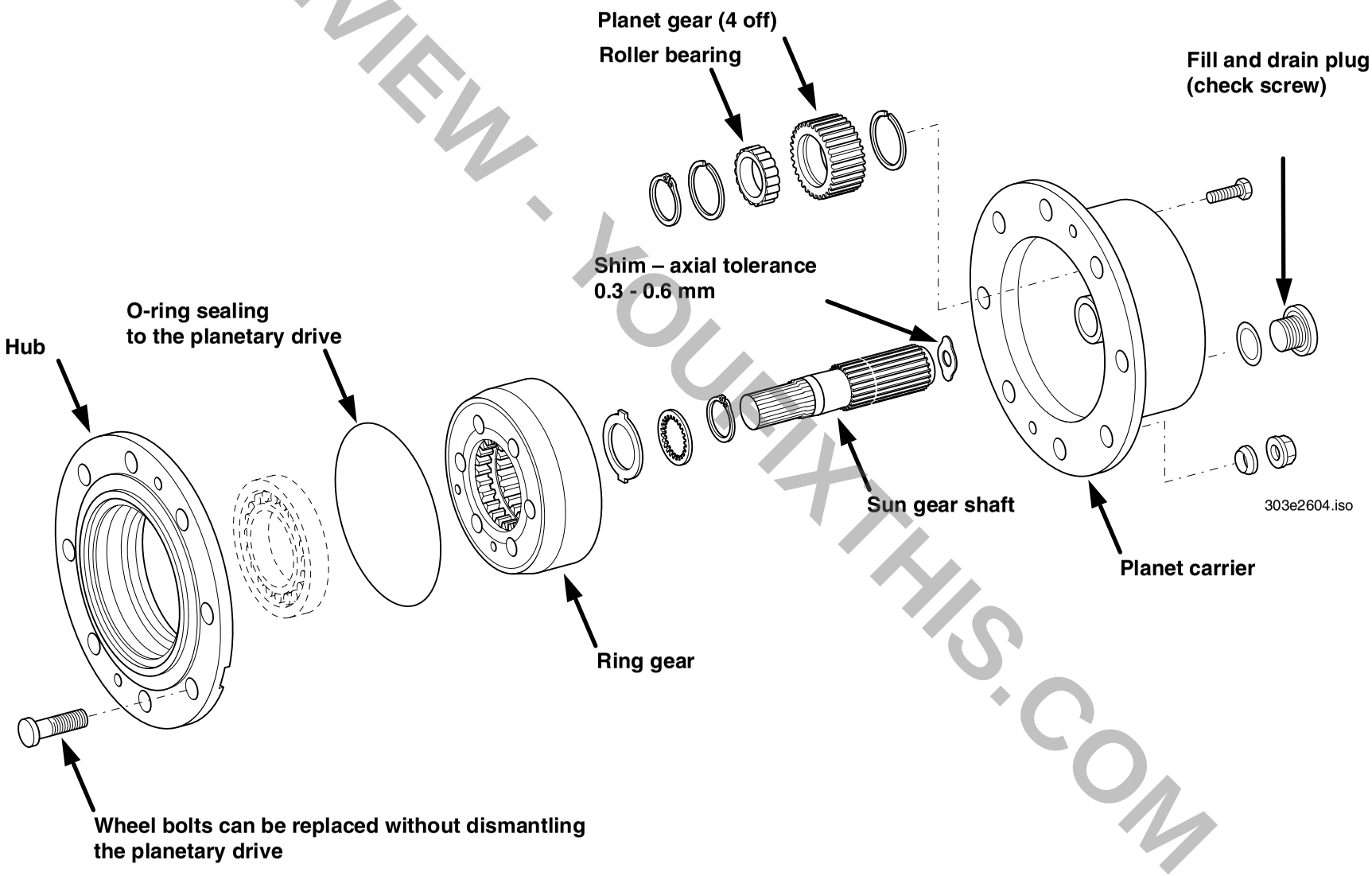
Hydraulics diagram 520 / 620

Models 303 58 / 304 59 - standard equipment
I→ 303 58 0001 →I 303 58 0348
I→ 304 59 0001 →I 304 59 0106

39 001 00 25 / 01.95

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Front & rear axle planetary drives (models 303 58 / 304 59)



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With coarse-pitch thread. All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	Threads according to DIN 912, DIN 931, DIN 933, etc.			Threads according to DIN 7984	
	8.8	10.9	12.9	8.8	10.9
M5	4.1 (5.5)	6 (8)	7 (10)	4 (5)	5 (7)
M6	7 (10)	10 (14)	13 (17)	6.3 (8.5)	9 (12)
M8	18 (25)	26 (35)	31 (42)	15 (20)	22 (30)
M10	33 (45)	48 (65)	59 (80)	30 (40)	44 (59)
M12	64 (87)	81 (110)	108 (147)	51 (69)	74 (100)
M14	100 (135)	133 (180)	170 (230)	81 (110)	118 (160)
M16	155 (210)	203 (275)	258 (350)	125 (170)	184 (250)
M18	207 (280)	302 (410)	354 (480)	181 (245)	254 (345)
M20	302 (410)	420 (570)	509 (690)	251 (340)	361 (490)
M22	406 (550)	575 (780)	686 (930)	339 (460)	487 (660)
M24	524 (710)	738 (1000)	878 (1190)	435 (590)	620 (840)
M27	767 (1040)	1092 (1480)	1305 (1770)	642 (870)	922 (1250)
M30	1047 (1420)	1482 (2010)	1770 (2400)	885 (1200)	1254 (1700)

With fine-pitch thread. All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	Threads according to DIN 912, DIN 931, DIN 933, etc.			Threads according to DIN 7984	
	8.8	10.9	12.9	8.8	10.9
M8X1.0	18 (25)	27 (37)	32 (43)	16 (22)	24 (32)
M10X1.0	37 (50)	55 (75)	65 (88)	32 (43)	48 (65)
M10X1.25	36 (49)	52 (71)	61 (83)	31 (42)	46 (62)
M12X1.25	64 (87)	96 (130)	111 (150)	55 (75)	81 (110)
M12X1.5	61 (83)	92 (125)	107 (145)	53 (72)	77 (105)
M14X1.5	100 (135)	148 (200)	173 (235)	89 (120)	129 (175)
M16X1.5	155 (210)	229 (310)	266 (360)	133 (180)	195 (265)
M18X1.5	232 (315)	332 (450)	391 (530)	199 (270)	284 (385)
M20X1.5	325 (440)	465 (630)	538 (730)	277 (375)	391 (530)
M22X1.5	435 (590)	620 (840)	723 (980)	369 (500)	524 (710)
M24X2.0	546 (740)	789 (1070)	922 (1250)	465 (630)	664 (900)
M27X2.0	811 (1100)	1143 (1550)	1328 (1800)	679 (920)	959 (1300)
M30X2.0	1106 (1500)	1586 (2150)	1844 (2500)	959 (1300)	1364 (1850)

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01.1.2 Removing and fitting the rocker assembly

Removing

- Remove the cylinder-head cover as per section 12A-01.
- Evenly and gradually release the fasteners of the rocker shaft brackets. Begin with the end brackets and move toward the centre. Remove the fasteners and washers and lift off the rocker assembly.

Important!

The latest engines do not have washers between nuts/bolts and the tilt lever bearing blocks. The retaining bolts have been changed.

- Remove the rubber oil seal (B) from the oil supply connection or the oil supply hole in the cylinder head.

Fitting

- Fit a new rubber oil seal in the oil supply hole in the oil supply hole in the cylinder head.
- Check that the push rods fit correctly in the cams of the camshaft. Fit the rocker assembly. Make sure the oil supply connection is fitted correctly into the oil seal of the cylinder head. Check that the ends of the adjustment screws of the rocker levers fit correctly in the sockets of the push rods.
- Fit the washers (if existing) and the fasteners onto the stud bolts of the rocker shaft brackets. Tighten the fasteners evenly and gradually. Begin with the inner fasteners and work towards the end fasteners. Make sure all fasteners are tightened evenly to the correct torque, see section 11 B.

Cylinder head assembly

Removing

- Drain the coolant.
- Disconnect the battery terminals.
- Remove the pipe fitted between the cold start device in the intake manifold and the fuel filter. Disconnect the electrical connection.
- Engine types AB, AD, YB and YD: Remove the boost control pipe fitted between the front of the intake manifold and the fuel pump.
- Remove the intake manifold.
- Engine types AB, AC, YB, YC and YD: Disconnect all connections to the turbocharger and remove the turbocharger, operation 18A-01.
- Remove the injection nozzles, operation 20A-02. Fit suitable covers to the nozzles and the open connections.
- Disconnect the coolant temperature sensor.
- Engine types AB, AD and certain AA: Remove the oil cooler, operation 21A-07A.
- Remove the cylinder-head cover, operation 12A-01.
- Remove the rocker assembly, operation 12A-02.
- Remove the push rods.
- Release the cylinder-head bolts evenly and gradually in the reverse order to that shown in figures 12A.08/A or B. Check the cylinder-head bolt for deformations with a straight edge (A1) as per figure (A2). If there is a visual reduction in the diameter of the thread outside the cylinder block (A3), the cylinder-head bolt must be discarded.
- Remove the cylinder head and put it on a surface that will not damage the sealing surface of the cylinder head. Do not use a lever to separate the cylinder head from the cylinder block.

Fitting

Special tools required:
Angle gauge MS.1531 for tightening the cylinder-head bolts

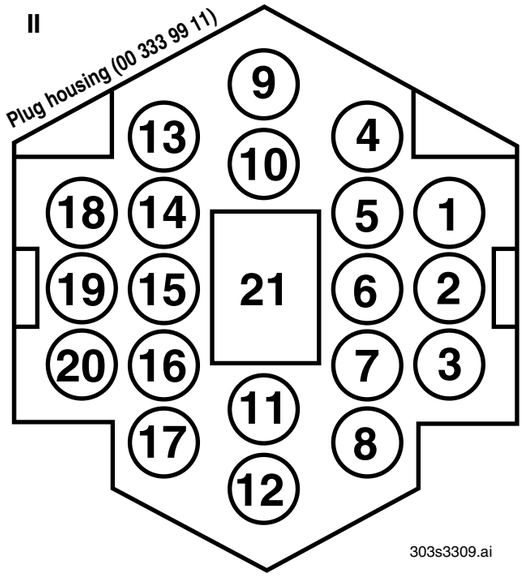
- Clean the sealing surface of the cylinder head and the upper surface of the cylinder block. Make sure there is no debris in the cylinder bores.
- Put the cylinder-head gasket in position. The cylinder-head gasket must be fitted without sealing compound. It is stamped “FRONT TOP” for correct assembly (12A.07/B).
- To hold the gasket in the correct position when the cylinder head is fitted, fit two suitable 1/2 UNF studs, figure (C), in positions 15 and 20 as per figure (B) or in positions 25 and 30 as per figure (A). Put the cylinder head on the cylinder block.
- Lightly lubricate the threads of the cylinder-head bolts and the thrust faces of the screw heads. Engage some of the cylinder-head bolts as per figures (A) or (B) and remove the guide studs. Engage the remainder of the cylinder-head bolts.
- Gradually and evenly tighten the cylinder-head bolt to 110 Nm (80 lbf ft) 11.1 kgf in the order shown in figures (A) or (B).
- Repeat the work steps as per section 5 to make sure all cylinder-head bolt are tightened to the correct torque.
- Tighten the cylinder-head bolts in the order shown in figures (A) or (B), taking into account the length. Short screws (S) must be turned a further 150° (2.5 flats). Medium screws (M) must be turned a further 180° (3 flats). Long screws (L) must be turned a further 210° (3.5 flats). A special tool can be used for this operation as per figure (D). Fit the tool between the socket and the handle. Position the stop mark against a suitable protrusion on the cylinder head to prevent movement of the degree dial in a clockwise direction, figure (D1). Turn the pointer to align it with the angle of the degree dial corresponding to the length of the cylinder-head bolt. Tighten the cylinder-head bolt until the pointer is at the zero position of the degree dial.
  If no special tool is available, make a suitable mark on the cylinder head in line with a corner of each screw , see figure 12A.09/A. Then make another mark, at the correct angle (anticlockwise), on the edge of the flange of each screw according to the length of the screw. Tighten these screws in the correct order until the marks on the flange are next to, and in line with, the marks on the cylinder head.

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Assignment table 21 pole interface (frame-side sleeve housing)

II



Established as per wiring diagram 39 001 01 90

Assignment table

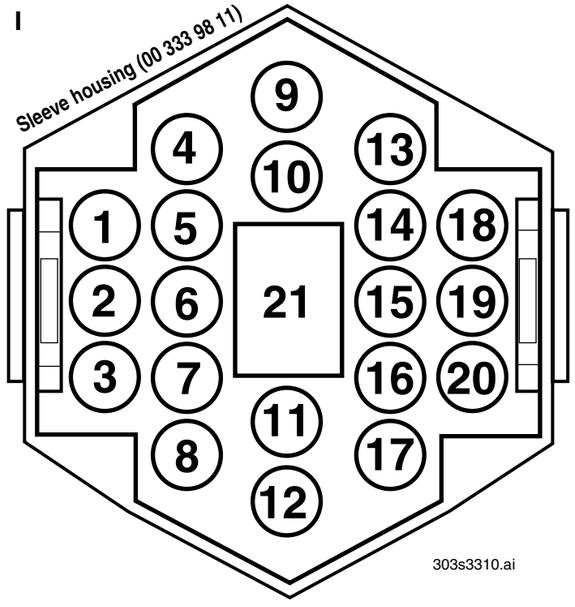
Pin no.	from	up to 00 333 98 11. as connection for	Colour	Cross section [mm²]
1	X2 (3)	Y4	white / blue	1.0
2	K2 (87)	Y1. Y2	white / purple	1.5
3	K3 (87)	Y3	green / purple	1.0
4	S5 (1)	Y7 + Y8	white/red	1.5
5	P5. V11	G1 (D+)	blue	1.0
6	-	-	-	-
7	-	-	-	-
8	Ground connection	Ground connection	brown/black	1.5
9	S14 (53c)	B6	brown / yellow	1.5
10	S21/V22	Y12	black / blue	1.0

Assignment table

Pin no.	from	up to 00 333 98 11. as connection for	Colour	Cross section [mm²]
11	S16	H20. H21	black / red	1.0
12	F12	E5	grey/black	1.5
13	F11	E8	grey/red	1.5
14	S14 (L). S15 (3)	H16/H18	black/white	1.5
15	S14 (R). S15 (1)	H17/H19	black / green	1.5
16	F4	Y9	black	1.0
17	P4 (-)	K12	brown	0.75
18	P4 (G)	K12	green	0.75
19	K10 (85)	S18	black / yellow	0.75
20	K11 (87)	M1 (50)	black	4.0
21	K10 (87)	M6 (2)	black	6.0

33.7.34 Assignment table 21 pole interface (cab-side plug housing)

I



Established as per wiring diagram 39 001 00 90

Assignment table

Pin no.	from	up to 00 333 99 11. as connection for	Colour	Cross section [mm²]
1	H6	S7	blue/yellow	0.75
2	S19 (H)	M7	black	1.5
3	S19 (M)	M7	red	1.5
4	S19 (L)	M7	white	1.5
5	H9	S10	blue / brown	0.75
6	H7	S8	blue/green	0.75
7	P1 (G)	B3	blue/black	1.0
8	P3 (G)	B5	blue/red	1.0
9	H11	X14	purple	0.75
10	H10	S11	brown	0.75

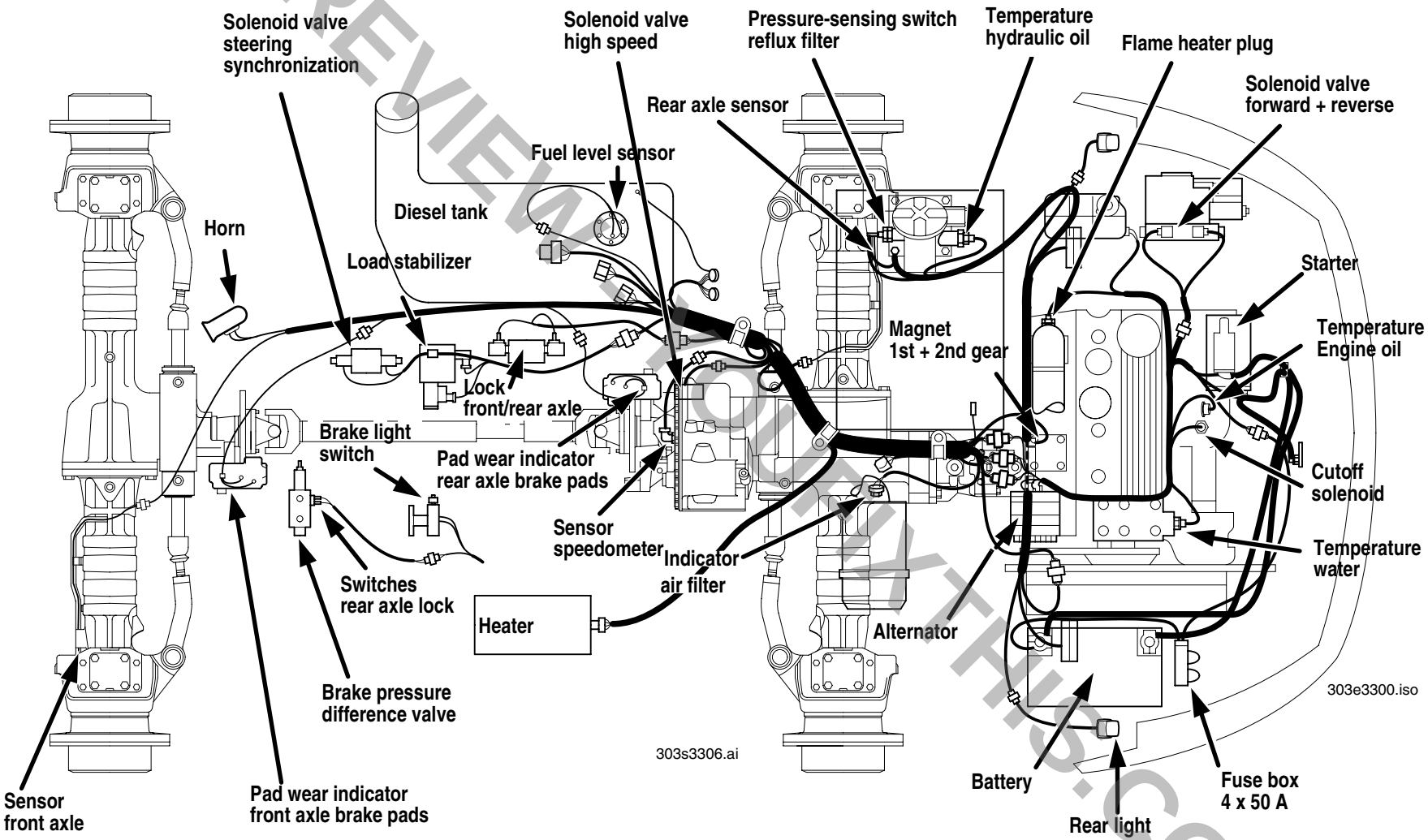
- M6 (1) since modification to 2nd cooling stage no longer connected!

Assignment table

Pin no.	from	up to 00 333 99 11. as connection for	Colour	Cross section [mm²]
11	P2 (G)	B4	blue/white	0.75
12	Earthing	Earthing	brown/black	1.5
13	H8	S9	black / green / yellow	0.75
14	K4 (87)	Y11	yellow	1.0
15	K4 (87a)	S20	white/yellow	1.0
16	X2 (2)	Y5	white/green	1.0
17	X2 (1)	Y6	grey / green	1.0
18	X1 (4)	B1	black / green	1.0
19	X1 (5)	B2	black / purple	1.0
20	F 18	B1 + B2	brown / purple	1.0
21	K10 (87a)	M6 (1)	brown	4.0

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33.6.22 Electrical system wheel loaders 520 / 620 (models 303 58/304 59)



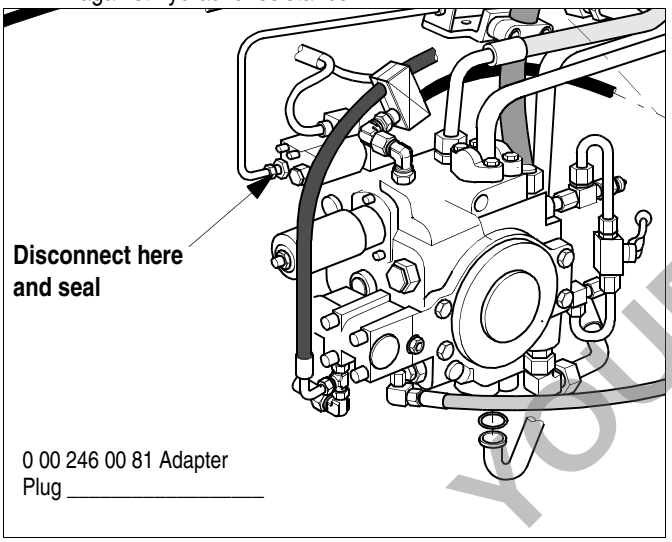
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22.6 Troubleshooting

22.6.1 Introduction

Troubleshooting on the hydrostatic drive requires the following:

- The hydraulic oil temperature in the tank must be 60°C for each measurement.
- The diesel engine must be OK i.e.
  - ➥ Fuel supply OK (filter)
  - ➥ Air intake OK (filter)
- The brake-inching line must be disconnected and sealed with a dummy cap.
  - ➥ The service brake can also be used to hold the vehicle against hydraulic resistance.



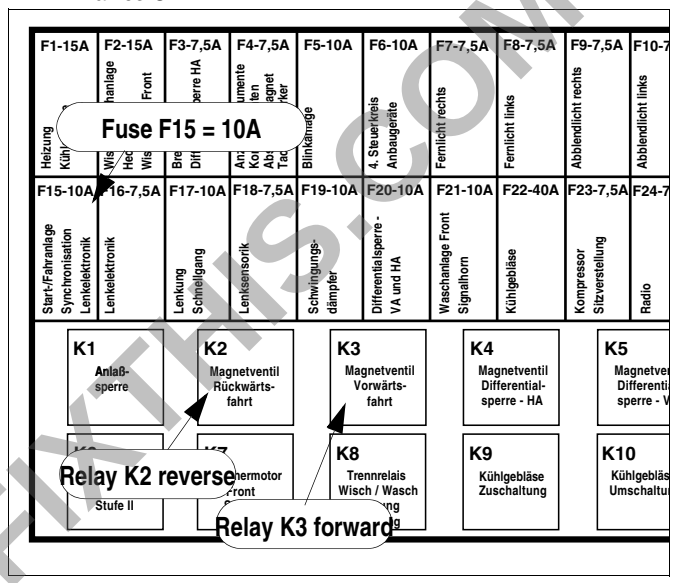
Tools required:

- 2 measuring lines
- 2 pressure gauges 60 bar (or 250 bar)
- 2 pressure gauges 600 bar
- Tachometer
- Thermometer
- Fork spanners WAF 10, 13, 27
- Allen keys 3, 5
- Screwdriver, if necessary

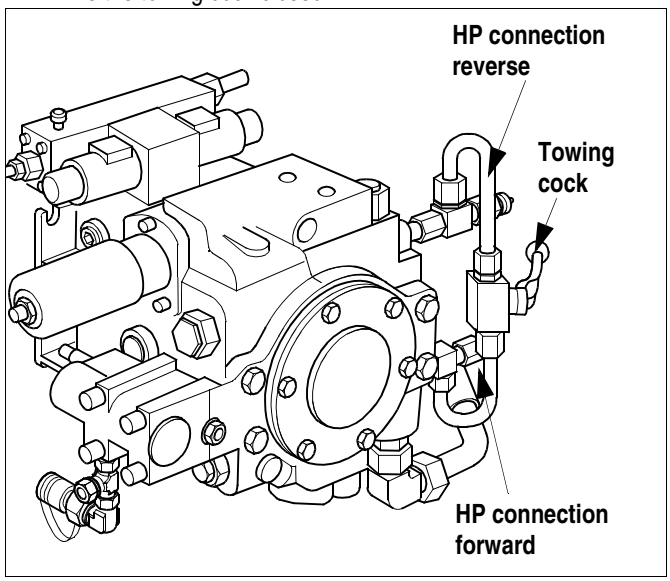
The vehicle does not move when the diesel engine is running!

☞ Check the following points:

- Is the parking brake released? (switch setting)
- Is fuse F15 (10A) in the fuse box OK?
- Are relays K2 and K3 for the forwards and reverse solenoid valves OK?



- Reflux filter in hydraulic oil tank OK? (by-pass valve, contamination)
- Is boost pressure present?
- Is current reaching the solenoid valve of the pump?
- Can the piston move freely in the solenoid valve?
- Is the towing cock closed?



- Is high pressure present?

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Specifications wheel loaders 520 / 620 (models 303 58 / 304 59)

Specifications 520 / 620

Frame

sturdy U-section frame, rubber-mounted operator cab and engine

Engine

Engine 520 (303 58) ➜I 303 58 0477

Product:	Perkins diesel engine
Model:	1004-4 LR
Cylinder arrangement:	In line
Number of cylinders:	4, water cooled
Capacity:	3990 cm^3
Nominal bore and stroke:	100 x 127 mm
Compression ratio:	16.5 : 1
Output:	53 kW / 72 HP, 2.200 rpm (DIN ISO 3046)
Rated engine torque:	230 Nm
Max. engine torque:	270 Nm, 1.200 rpm
Fuel consumption	230 g/KWh minimum
Fuel injection system:	Direct fuel injection
Injection pressure:	250 bar
Firing order:	1 – 3 – 4 – 2
Start of delivery:	17.5° before top dead centre
Starting aid:	Flame heater system (preheating time 10 – 15 seconds)
Oil lubrication of engine is ensured up to the following inclined position:	Max. lateral inclination left/right: 67/67 % Max. inclination upward/downward: 67/67 % **Observe tilting limit of the machine!**
Oil pressure:	Min. 2.1 bar minimum, 2,200 rpm
Valve tip clearance:	Inlet 0.20 mm Outlet 0.45 mm Engine at cold or warm temperature respectively

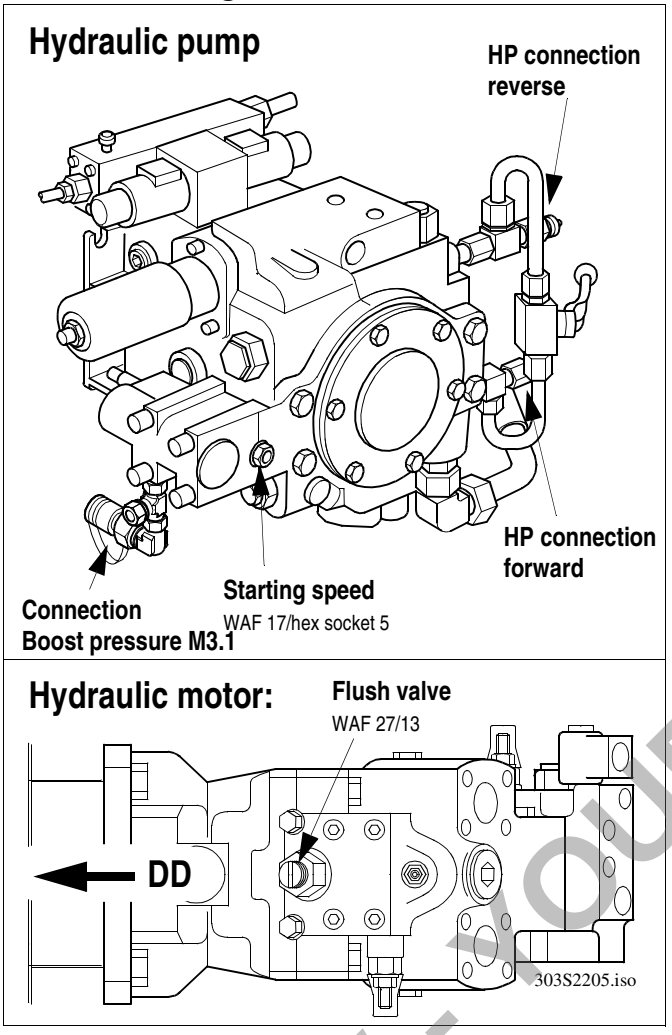
Engine 620 (304 59) ➜I 304 59 0328

Product:	Perkins diesel engine
Model:	1004-4 HR
Cylinder arrangement:	In line
Number of cylinders:	4, water cooled
Capacity:	3990 cm^3
Nominal bore and stroke:	100 x 127 mm
Compression ratio:	16.5 : 1
Output:	58.5 kW / 79.5 HP, 2.200 rpm (DIN ISO3046)
Rated engine torque:	243 Nm
Max. engine torque:	279 Nm, 1.400 rpm
Fuel consumption	230 g/KWh minimum
Fuel injection system:	Direct fuel injection
Injection pressure:	250 bar
Firing order:	1 – 3 – 4 – 2
Start of delivery:	17.5° before top dead centre
Starting aid:	Flame heater system (preheating time 10 – 15 seconds)
Oil lubrication of engine is ensured up to the following inclined position:	Max. lateral inclination left/right: 67/67 % Max. inclination upward/downward: 67/67 % **Observe tilting limit of the machine!**
Oil pressure:	Min. 2.1 bar minimum, 2,200 rpm
Valve tip clearance:	Inlet 0.20 mm Outlet 0.45 mm Engine at cold or warm temperature respectively

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22.4.2 Starting RPMs



	Rated value	Correction
Starting RPMs	950 - 1050 rpm	Change setting at starting speed set screw. Turn clockwise = sooner Turn anticlockwise = later
Boost pressure drop when starting speed reached	1.5 - 2.5 bar	Set flushing pressure relief valve on hydraulic motor. Turn clockwise = smaller Turn anticlockwise = larger
High pressure	30 - 70 bar when starting	

Info

The vehicle starts moving from about 50 bar high pressure!

Tools required:

- 2 measuring lines
- Pressure gauge 60 bar
- Pressure gauge 600 bar
- Open-end wrenches WAF 27, 17 and 13
- Allen key 5
- Tachometer

Notes:

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22.5 Test reports

22.5.1 Test report 520 model 303 58

Serial number			
Hydraulic pump – serial number			
Hydraulic motor – serial number			
Settings at oil temperature 45°C -5°:	**Nominal value**	**Actual value**	**Adjusted**
Hydraulic pump			
Boost pressure min. (800 rpm)	23 - 25 bar		
Boost pressure max. (n> 2400 rpm)	26 - 29 bar		
Starting RPMs	950 - 1050 rpm		
Boost pressure drop	1.5 - 2.5 bar		
High pressure	450 - 480 bar		
Traction force (check value only)	5100 kp		
Droop without work hydraulics	1950 - 2100 rpm		
Droop with work hydraulics	≥ 1700 rpm		
Dynamic droop 220 - 250 bar high pressure	2050 - 2200 rpm		
High pressure with work hydraulics	320 - 400 bar		
Pilot pressure (2350 rpm)	30 - 34 bar		
Hydraulic motor:			
Control pressure M3 ~ 30 bar	1700 - 2000 rpm		
Driving on slopes M4	220 - 250 bar		
Brake-inching	20 - 50 bar		
Speed of wheels at nominal speed n = 2200 rpm			
20 kph	100 - 120 rpm		
30 kph	140 - 160 rpm		
37 kph	187 - 207 rpm		
Work and steering hydraulics:			
Work hydraulics	230 - 245 bar		
Tilt ram pressure	115 - 135 bar		
Steering pressure	160 - 180 bar		
Lowering speed of loader unit (oil temperature **60**°C, pressure in ram p = 100 bar, time t = 10 min)			
Lift ram	Max. 14 mm		
Tilt ram	Max 15 mm		

Remarks:

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01 Perkins diesel engine

01.1 Specifications

Engine 520 (303 58)

Product:	Perkins diesel engine
Model:	1004-4 LR
Cylinder arrangement:	In line
Number of cylinders:	4, water cooled
Capacity:	3990 cm³
Nominal bore and stroke:	100 x 127 mm
Compression ratio:	16,5
Output:	50 kW / 68 HP, 2,200 rpm (DIN ISO 3046)
Rated engine torque:	208 Nm
Max. torque:	250 Nm, 1,200 rpm
Fuel consumption	230 g/KWh minimum
Fuel injection system:	Direct fuel injection with in-line pumps
Injection pressure:	250 bar
Firing order:	1 – 3 – 4 – 2
Start of delivery:	17.5° before top dead centre
Starting aid:	Flame heater system (preheating time 10 – 15 seconds)
Oil lubrication of engine is ensured up to the following inclined position:	max. lateral inclination left/right: 67/67 % up/downhill gradient max.: 67/67 % **Observe tilting limit of the machine!**
Oil pressure:	2.1 bar minimum at 2.200 rpm
Valve tip clearance:	Intake valve: 0.20 mm outlet valve 0.45 mm Cold or warm engine respectively

Engine 620 (304 59)

Product:	Perkins diesel engine
Model:	1004-4 HR
Cylinder arrangement:	In line
Number of cylinders:	4, water cooled
Capacity:	3990 cm³
Nominal bore and stroke:	100 x 127 mm
Compression ratio:	16,5
Output:	56.5 kW / 77 HP, 2,200 rpm (DIN ISO 3046)
Rated engine torque:	247 Nm
Max. torque:	279 Nm, 1,400 rpm
Fuel consumption	230 g/KWh minimum
Fuel injection system:	Direct fuel injection with in-line pumps
Injection pressure:	250 bar
Firing order:	1 – 3 – 4 – 2
Start of delivery:	17.5° before top dead centre
Starting aid:	Flame heater system (preheating time 10 – 15 seconds)
Oil lubrication of engine is ensured up to the following inclined position:	max. lateral inclination left/right: 67/67 % up/downhill gradient max.: 67/67 % **Observe tilting limit of the machine!**
Oil pressure:	2.1 bar minimum at 2.200 rpm
Valve tip clearance:	Intake valve: 0.20 mm outlet valve 0.45 mm Cold or warm engine respectively

01.1.1 Valve tip clearance

Checking and adjusting **12A-05**

The valve tip clearance is measured between the top of the valve stem and the tilt lever as per figure (A). With the engine cold or warm, the correct clearances are 0.20 mm (0.008 in) for the intake valves and 0.45 mm (0.018 in) for the exhaust valves. See B in figure for the position of the intake and exhaust valves.

Caution!

Cylinder no. 1 is located opposite the power take-off side of the engine.

Four cylinder engines

- Turn the crankshaft in the normal direction of rotation until the intake valve of the 4th ram has just opened and the exhaust valve of the same cylinder has not fully closed (“overlapping”). Check the valve tip clearances of the 1st cylinder and adjust if necessary.
- Turn the crankshaft until the position of the valves of the 2nd cylinder corresponds to the position as described in item 1, and check or adjust the valve tip clearances of the valves on the 3rd cylinder.
- Let the valves of the first cylinder overlap, and check or adjust the valve tip clearances of the valves on the 4th cylinder.
- Then let the valves of the 3rd cylinder overlap, and check or adjust the valve tip clearances of the valves on the 2nd cylinder.

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