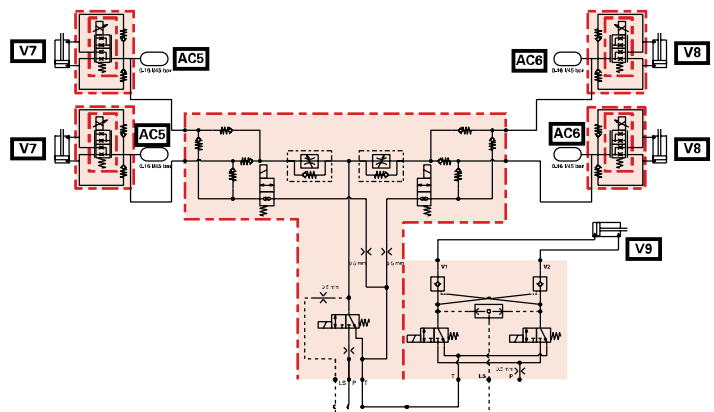
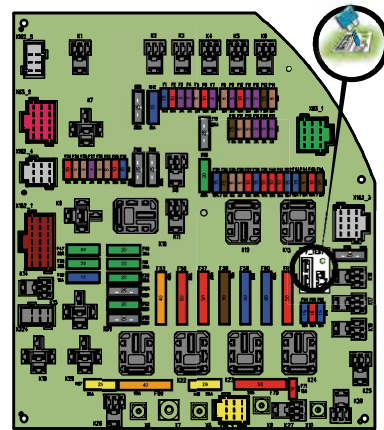


Workshop Service Manual

Technician Service Book -

6400 series tractors

Electrical and hydraulics diagrams



Technician Service Book - 6400 series tractors

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1 - General

- A General specifications
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A - General specifications

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1 Model 6445

Engine	
Brand	Perkins
Type	1104D E44TA
Nominal power (ISO TR14396) at 2200 rpm	95 hp
Maximum power (ISO TR14396) at 2000 rpm	100 hp
Maximum torque (ISO TR14396)	400 Nm (295 lbf ft)
Maximum PTO power (OECD) at PTO 1000 rpm	88 hp
Idle speed	950 rpm
Maximum speed	2350 rpm
Engine weight	303 kg (668 lb)
Number of cylinders	4
Engine cubic capacity	4,4 l (1.2 gal (US))
Piston travel	127 mm (5.0 in)
Piston diameter	105 mm (4.1 in)
Compression ratio	16.2:1
Compression pressure	-
Injection pump brand	Delphi
Injection pump type	SF200HP
Firing order	1-3-4-2
Maximum pressure in the high-pressure system	1600 bar
Injector brand	Delphi
Injector type	SF200
Charge pump type	Mechanical, driven by the injection pump
Fuel prefilter filtration capacity	20 µ
Main fuel filter filtration capacity	2 µ
Low-pressure system pressure at minimum speed	4 bar (58 psi) to 5 bar (73 psi)
Low-pressure system pressure at maximum speed	4 bar (58 psi) to 5 bar (73 psi)
Recommended oil:	CI - 4 (ACEA and API)
Maximum operating tilt (precautions)	-
Oil/fuel consumption	Maximum 0.1%
Lubrication system	By gear pump
Oil cooling system	Radiator
Oil pressure at minimum speed	3 bar (44 psi)
Oil pressure at maximum speed	3,5 bar (51 psi) to 4,5 bar (65 psi)
Relief valve adjustment pressure	4,5 bar (65 psi)
Air suction type	Turbo air/air
Air preheating type	Glow plugs
Number of valves	4 per cylinder = 16
Valve clearance value	0,35 mm (0.01 in) +/- 0,05 mm (0.002 in)
Engine cooling system	Coolant
Fan type	Viscostatic
Thermostat begins to open at	82 °C (180 °F)
Liquid temperature from - to	-35 °C (-31 °F) to 108 °C (226 °F)

Engine	
Block preheater	110 or 220 volts
Fuel preheater	-
Internal EGR system	Yes

Transmission/rear axle	
Gearbox type	GBA25
Transmission type	Dyna-6
Number of ratios	6
Number of ranges	4
Number of gears	24
Creeper gears	4/1
Number of gears with creeper gears	36/36
Super creeper gears	14/1
Number of gears with super creeper gears	48/48
Maximum speed	40 km/h (25 mile/h)
Rear axle type	GPA22
Number of pinion/ring gear teeth	8/39
Rear axle ratio (crownwheel and pinion)	24.750
4WD ratio	1.04
Final drive type	HD
Final drive reduction ratio	(53+13)/13
Maximum 4WD clutch torque	100 daNm (738 lbf ft)
Number of 4WD discs	4
Main brake type	Disc
Number of discs	1 per trumpet housing
Braking pressure	-
Parking brake type	Hand brake
Trailer brake type	Hydraulics
Hydraulic trailer braking pressure	0 to 150 bar (2176 psi)
Maximum operating tilt - pitch (front/rear)	15°
Maximum operating tilt - roll (right/left)	15°
Maximum operating tilt - combined	15°
Transmission preheater	110 V accessory kit available
Total loaded weight supported by rear axle - 40 km/h (25 mile/h)	2WD = 6100 kg (13448 lb) 4WD = 6500 kg (14330 lb) assisted brakes, 6300 kg (13889 lb) non-assisted brakes
Total loaded weight supported by rear axle - 50 km/h (31 mile/h)	-

4WD front axle and 2WD front axle	
2WD front axle brand	LODI
Axle type	Fixed
Supplier reference	LODI 140 CP
Total loaded weight supported by front axle	2800 kg (6173 lb)
4WD front axle brand	DANA

4WD front axle and 2WD front axle	
Axle type	Suspended or fixed
Supplier reference - fixed front axle	720/527
Supplier reference - suspended front axle	730/604 (1 accumulator) 730/608 (2 accumulators)
Rotational direction	anti-clockwise
Total loaded weight supported by front axle - 40 km/h (25 mile/h)	3300 kg (7275 lb)
Total loaded weight supported by front axle - 50 km/h (31 mile/h)	-
Recommended oil type (beam and final drive)	SAE 85 W 90 (API GL5)
Total ratio for fixed front axle	18.975
Total ratio for suspended front axle	19.00
Number of teeth on final drive	14 x 27 x 70
Ratio for fixed axle final drive	4.6
Ratio for suspended axle final drive	6
Number of fixed axle pinion/ring gear teeth	8/33
Number of suspended axle pinion/ring gear teeth	12/38
Differential type	Coupler
Number of discs on multidisc differential	-
Maximum steering angle	55°
Oscillation angle	-
Type of oscillation stop	Mechanical
Steering ram diameter	63 mm (2.5 in) x 32 mm (1.3 in)
Steering ram stroke	2 x 125 mm (4.9 in)
Suspension type	Hydraulics
Suspension ram diameter	65 mm (2.6 in) x 60 mm (2.4 in)
Suspension ram stroke	100 mm (3.9 in)
Hydraulic control unit brand	Husco
Hydraulic control unit nominal pressure	200 bar (2901 psi)
Number of accumulators	1 accumulator (730/604) 2 accumulators (730/608)
Accumulator pressure	1 accumulator 1 l (0.3 gal (US)) = 20 bar (290 psi) 2 accumulators: – Left 0,5 l (0.1 gal (US)) = 10 bar (145 psi) – Right 0,75 l (0.2 gal (US)) = 50 bar (725 psi)
Suspension sensor type	Angular potentiometer.
Steering sensor type (with Auto-Guide option)	-
Factor K	Fixed axle = 1.360 Suspended axle = 1.358

Electrohydraulic	
System type	Open Centre (OC) 57 l/min (15.1 gal/min (US)) or Closed Centre Load Sensing (CCLS) 110 l/min (29.1 gal/min (US))
Flow rate	57 l/min (15.1 gal/min (US)) (OC) 110 l/min (29.1 gal/min (US)) (CCLS)
High-pressure pump type	Bosch Rexroth gear pump (OC) Bosch Rexroth piston pump (CCLS)
High-pressure pump displacement	19 cm ³ (1.16 in ³) (OC) 45 cm ³ (2.75 in ³) (CCLS)
High-pressure pump rotational speed	2200 rpm
High-pressure pump maximum flow rate	57 l/min (15.1 gal/min (US)) (OC) 117 l/min (30.9 gal/min (US)) (CCLS)
High-pressure pump maximum pressure	200 bar (2901 psi)
Maximum quantity of oil to add for heavy implements	10 l (2.6 gal (US))
Maximum exportable oil quantity (without adding oil)	32 l (8.5 gal (US))
Maximum exportable oil quantity (adding oil)	42 l (11.1 gal (US))
Charge pump type	Suction (OC) Bosch Rexroth 71 cm ³ (4.33 in ³) gear pump (CCLS)
Main relief valve adjustment pressure	195 bar (2828 psi) ± 5 bar (73 psi) (OC) 230 bar (3336 psi) ± 5 bar (73 psi) (CCLS)
Number of spool valves (maximum)	4
Number of front "push-pull" connectors (maximum)	2
Number of rear "push-pull" connectors (maximum)	8
Maximum flow rate per spool valve	57 l/min (15.1 gal/min (US)) (OC) 100 l/min (26.4 gal/min (US)) (CCLS)
Spool valve control type	Mechanical or electrohydraulic (CCLS only)
Recommended oil:	According to MF CMS M 1145 specification

Steering	
Steering type	Hydrostatic
Type of control	Steering wheel
Orbitrol displacement	2WD = 80 cm ³ (4.88 in ³) 4WD = 125 cm ³ (7.63 in ³)
Steering ram diameter	63 mm (2.5 in) x 32 mm (1.3 in)
Steering ram stroke	2 x 125 mm (4.9 in)
Working pressure	175 bar (2538 psi) ± 5 bar (73 psi)
Pressure relief valve adjustment pressure	175 bar (2538 psi) ± 5 bar (73 psi)
Shock valve adjustment pressure	240 bar (3481 psi)
Oil recommended for steering	According to MF CMS M 1145 specification

Linkage	
Rear lift ram diameter	66 mm (2.6 in) or 75 mm (3.0 in)
Rear linkage travel	696 mm (27.4 in) or 702 mm (27.7 in)
Maximum lifting capacity at ball joints (rear)	5850 kg (12897 lb) (rams 66 mm (2.6 in)) 7100 kg (15653 lb) (rams 75 mm (3.0 in))

Linkage	
Operating pressure (rear)	180 bar (2611 psi)
3-point linkage category (rear)	CAT2 or CAT3
Front lift ram diameter	70 mm (2.8 in)
Front linkage travel	-
Maximum lifting capacity at ball joints (front)	2500 kg (5512 lb)
Operating pressure (front)	180 bar (2611 psi)
3-point linkage category (front)	CAT2

Rear power take-off (PTO)	
Number of selections possible for rear PTO	540/1000 540/1000/540 ECO/1000 ECO with GSPTO option
Maximum permissible power 540/540 ECO in 1"3/8 (6 and 21 splines)	540 = 73 kW / 540E = 40 kW
Maximum permissible power 540/540 ECO in 1"3/4 (20 splines)	540 = 80 kW / 540E = 40 kW
Maximum permissible power 1000/1000 ECO in 1"3/8 (6 and 21 splines)	1000 = 73 kW / 1000E = 40 kW
Maximum permissible power 1000/1000 ECO in 1"3/4 (20 splines)	1000 = 73 kW / 1000E = 40 kW
Engine speed if PTO 540	1980 rpm
Engine speed if PTO 540 ECO	1550 rpm
Engine speed if PTO 1000	2000 rpm
Engine speed if PTO 1000 ECO	1550 rpm
Rotational direction	Clockwise
Clutch type	Multidisc hydraulic
Number of clutch discs	4
Control pressure	21 bar (305 psi)
Splined shaft type	6 or 21 x 1"3/8 (diameter 35 mm (1.4 in)) splines or 20 x 1"3/4 (diameter 45 mm (1.8 in)) splines

Front power take-off	
Number of selections possible for front PTO	1000 rpm
Maximum permissible power - clockwise	-
Maximum permissible power - anti-clockwise	94 kW
Maximum permissible torque - clockwise	-
Maximum permissible torque - anti-clockwise	900 Nm (664 lbf ft)
Rotational direction	Anti-clockwise
Engine speed if PTO 1000	2000 rpm
Ratio	2
Clutch type	Multidisc hydraulic
Splined shaft type	6 or 21 x 1"3/8 (diameter 35 mm (1.4 in)) splines

Electric	
Battery brand	TAB
Battery specifications (2 batteries)	12 V - 66 A/H
Maximum current at start-up (IEC standard)	840 A
Starter type	12 V
Starter power	3 kW
Alternator type	14 V/80 A or 14 V/120 A
Current available on ISOBUS connector	50 A

Electronics	
DCC2	Instrument panel
4 AUTO 5 units	Transmission (x 2) Linkage Suspended front axle
SB 23 Bosch valves	Electrohydraulic spool valves
1 Perkins ECM Tier 3	Engine
1 Sisu ECU Tier 3	-
1 Orbitrol Danfoss valve	-
Data 3	Onboard computer
Automatic air conditioning module	Air conditioning

Cab	
Type of cab available	Fixed or suspended
Type of rear-view mirror control available	Manual or electric
Type of air conditioning control available	Manual or automatic
Type and brand of air conditioning compressor	Sanden with axial pistons
Compressor displacement	154,9 cm ³ (9.45 in ³)/rev.
Refrigerant	R134a
Cab noise level	71 DBA
Roof type	Standard or High Visibility

2 Model 6455

Engine	
Brand	Perkins
Type	1104D E44TA
Nominal power (ISO TR14396) at 2200 rpm	105 hp
Maximum power (ISO TR14396) at 2000 rpm	112 hp
Maximum torque (ISO TR14396)	463 Nm (341 lbf ft)
Maximum PTO power (OECD) at PTO 1000 rpm	100 hp
Idle speed	950 rpm
Maximum speed	2350 rpm
Engine weight	303 kg (668 lb)
Number of cylinders	4
Engine cubic capacity	4,4 l (1.2 gal (US))
Piston travel	127 mm (5.0 in)
Piston diameter	105 mm (4.1 in)
Compression ratio	16.2:1
Compression pressure	-
Injection pump brand	Delphi
Injection pump type	SF200HP
Firing order	1-3-4-2
Maximum pressure in the high-pressure system	1600 bar
Injector brand	Delphi
Injector type	SF200
Charge pump type	Mechanical, driven by the injection pump
Fuel prefilter filtration capacity	20 μ
Main fuel filter filtration capacity	2 μ
Low-pressure system pressure at minimum speed	4 bar (58 psi) to 5 bar (73 psi)
Low-pressure system pressure at maximum speed	4 bar (58 psi) to 5 bar (73 psi)
Recommended oil:	CI - 4 (ACEA and API)
Maximum operating tilt (precautions)	-
Oil/fuel consumption	Maximum 0.1%
Lubrication system	By gear pump
Oil cooling system	Radiator
Oil pressure at minimum speed	3 bar (44 psi)
Oil pressure at maximum speed	3,5 bar (51 psi) to 4,5 bar (65 psi)
Relief valve adjustment pressure	4,5 bar (65 psi)
Air suction type	Turbo air/air
Air preheating type	Glow plugs
Number of valves	4 per cylinder = 16
Valve clearance value	0,35 mm (0.01 in) +/- 0,05 mm (0.002 in)
Engine cooling system	Coolant
Fan type	Viscostatic
Thermostat begins to open at	82 °C (180 °F)
Liquid temperature from - to	-35 °C (-31 °F) to 108 °C (226 °F)

Engine	
Block preheater	110 or 220 volts
Fuel preheater	-
Internal EGR system	Yes

Transmission/rear axle	
Gearbox type	GBA25
Transmission type	Dyna-6
Number of ratios	6
Number of ranges	4
Number of gears	24
Creeper gears	4/1
Number of gears with creeper gears	36/36
Super creeper gears	14/1
Number of gears with super creeper gears	48/48
Maximum speed	40 km/h (25 mile/h)
Rear axle type	GPA22
Number of pinion/ring gear teeth	8/39
Rear axle ratio (crownwheel and pinion)	24.750
4WD ratio	1.04
Final drive type	HD
Final drive reduction ratio	(53+13)/13
Maximum 4WD clutch torque	100 daNm (738 lbf ft)
Number of 4WD discs	4
Main brake type	Disc
Number of discs	1 per trumpet housing
Braking pressure	-
Parking brake type	Hand brake
Trailer brake type	Hydraulics
Hydraulic trailer braking pressure	0 to 150 bar (2176 psi)
Maximum operating tilt - pitch (front/rear)	15°
Maximum operating tilt - roll (right/left)	15°
Maximum operating tilt - combined	15°
Transmission preheater	110 V accessory kit available
Total loaded weight supported by rear axle - 40 km/h (25 mile/h)	2WD = 6100 kg (13448 lb) 4WD = 6500 kg (14330 lb) assisted brakes, 6300 kg (13889 lb) non-assisted brakes
Total loaded weight supported by rear axle - 50 km/h (31 mile/h)	-

4WD front axle and 2WD front axle	
2WD front axle brand	LODI
Axle type	Fixed
Supplier reference	LODI 140 CP
Total loaded weight supported by front axle	2800 kg (6173 lb)
4WD front axle brand	DANA

4WD front axle and 2WD front axle	
Axle type	Suspended or fixed
Supplier reference - fixed front axle	720/527
Supplier reference - suspended front axle	730/604 (1 accumulator) 730/608 (2 accumulators)
Rotational direction	anti-clockwise
Total loaded weight supported by front axle - 40 km/h (25 mile/h)	3300 kg (7275 lb)
Total loaded weight supported by front axle - 50 km/h (31 mile/h)	-
Recommended oil type (beam and final drive)	SAE 85 W 90 (API GL5)
Total ratio for fixed front axle	18.975
Total ratio for suspended front axle	19.00
Number of teeth on final drive	14 x 27 x 70
Ratio for fixed axle final drive	4.6
Ratio for suspended axle final drive	6
Number of fixed axle pinion/ring gear teeth	8/33
Number of suspended axle pinion/ring gear teeth	12/38
Differential type	Coupler
Number of discs on multidisc differential	-
Maximum steering angle	55°
Oscillation angle	-
Type of oscillation stop	Mechanical
Steering ram diameter	63 mm (2.5 in) x 32 mm (1.3 in)
Steering ram stroke	2 x 125 mm (4.9 in)
Suspension type	Hydraulics
Suspension ram diameter	65 mm (2.6 in) x 60 mm (2.4 in)
Suspension ram stroke	100 mm (3.9 in)
Hydraulic control unit brand	Husco
Hydraulic control unit nominal pressure	200 bar (2901 psi)
Number of accumulators	1 accumulator (730/604) 2 accumulators (730/608)
Accumulator pressure	1 accumulator 1 l (0.3 gal (US)) = 20 bar (290 psi) 2 accumulators: – Left 0,5 l (0.1 gal (US)) = 10 bar (145 psi) – Right 0,75 l (0.2 gal (US)) = 50 bar (725 psi)
Suspension sensor type	Angular potentiometer.
Steering sensor type (with Auto-Guide option)	-
Factor K	Fixed axle = 1.360 Suspended axle = 1.358

Electrohydraulic	
System type	Open Centre (OC) 57 l/min (15.1 gal/min (US)) or Closed Centre Load Sensing (CCLS) 110 l/min (29.1 gal/min (US))
Flow rate	57 l/min (15.1 gal/min (US)) (OC) 110 l/min (29.1 gal/min (US)) (CCLS)
High-pressure pump type	Bosch Rexroth gear pump (OC) Bosch Rexroth piston pump (CCLS)
High-pressure pump displacement	19 cm ³ (1.16 in ³) (OC) 45 cm ³ (2.75 in ³) (CCLS)
High-pressure pump rotational speed	2200 rpm
High-pressure pump maximum flow rate	57 l/min (15.1 gal/min (US)) (OC) 117 l/min (30.9 gal/min (US)) (CCLS)
High-pressure pump maximum pressure	200 bar (2901 psi)
Maximum quantity of oil to add for heavy implements	10 l (2.6 gal (US))
Maximum exportable oil quantity (without adding oil)	32 l (8.5 gal (US))
Maximum exportable oil quantity (adding oil)	42 l (11.1 gal (US))
Charge pump type	Suction (OC) Bosch Rexroth 71 cm ³ (4.33 in ³) gear pump (CCLS)
Main relief valve adjustment pressure	195 bar (2828 psi) ± 5 bar (73 psi) (OC) 230 bar (3336 psi) ± 5 bar (73 psi) (CCLS)
Number of spool valves (maximum)	4
Number of front "push-pull" connectors (maximum)	2
Number of rear "push-pull" connectors (maximum)	8
Maximum flow rate per spool valve	57 l/min (15.1 gal/min (US)) (OC) 100 l/min (26.4 gal/min (US)) (CCLS)
Spool valve control type	Mechanical or electrohydraulic (CCLS only)
Recommended oil:	According to MF CMS M 1145 specification

Steering	
Steering type	Hydrostatic
Type of control	Steering wheel
Orbitrol displacement	2WD = 80 cm ³ (4.88 in ³) 4WD = 125 cm ³ (7.63 in ³)
Steering ram diameter	63 mm (2.5 in) x 32 mm (1.3 in)
Steering ram stroke	2 x 125 mm (4.9 in)
Working pressure	175 bar (2538 psi) ± 5 bar (73 psi)
Pressure relief valve adjustment pressure	175 bar (2538 psi) ± 5 bar (73 psi)
Shock valve adjustment pressure	240 bar (3481 psi)
Oil recommended for steering	According to MF CMS M 1145 specification

Linkage	
Rear lift ram diameter	66 mm (2.6 in) or 75 mm (3.0 in)
Rear linkage travel	696 mm (27.4 in) or 702 mm (27.7 in)
Maximum lifting capacity at ball joints (rear)	5850 kg (12897 lb) (rams 66 mm (2.6 in)) 7100 kg (15653 lb) (rams 75 mm (3.0 in))

Linkage	
Operating pressure (rear)	180 bar (2611 psi)
3-point linkage category (rear)	CAT2 or CAT3
Front lift ram diameter	70 mm (2.8 in)
Front linkage travel	-
Maximum lifting capacity at ball joints (front)	2500 kg (5512 lb)
Operating pressure (front)	180 bar (2611 psi)
3-point linkage category (front)	CAT2

Rear power take-off (PTO)	
Number of selections possible for rear PTO	540/1000 540/1000/540 ECO/1000 ECO with GSPTO option
Maximum permissible power 540/540 ECO in 1"3/8 (6 and 21 splines)	540 = 73 kW / 540E = 40 kW
Maximum permissible power 540/540 ECO in 1"3/4 (20 splines)	540 = 80 kW / 540E = 40 kW
Maximum permissible power 1000/1000 ECO in 1"3/8 (6 and 21 splines)	1000 = 73 kW / 1000E = 40 kW
Maximum permissible power 1000/1000 ECO in 1"3/4 (20 splines)	1000 = 73 kW / 1000E = 40 kW
Engine speed if PTO 540	1980 rpm
Engine speed if PTO 540 ECO	1550 rpm
Engine speed if PTO 1000	2000 rpm
Engine speed if PTO 1000 ECO	1550 rpm
Rotational direction	Clockwise
Clutch type	Multidisc hydraulic
Number of clutch discs	5
Control pressure	21 bar (305 psi)
Splined shaft type	6 or 21 x 1"3/8 (diameter 35 mm (1.4 in)) splines or 20 x 1"3/4 (diameter 45 mm (1.8 in)) splines

Front power take-off	
Number of selections possible for front PTO	1000 rpm
Maximum permissible power - clockwise	-
Maximum permissible power - anti-clockwise	94 kW
Maximum permissible torque - clockwise	-
Maximum permissible torque - anti-clockwise	900 Nm (664 lbf ft)
Rotational direction	Anti-clockwise
Engine speed if PTO 1000	2000 rpm
Ratio	2
Clutch type	Multidisc hydraulic
Splined shaft type	6 or 21 x 1"3/8 (diameter 35 mm (1.4 in)) splines

Electric	
Battery brand	TAB
Battery specifications (2 batteries)	12 V - 66 A/H
Maximum current at start-up (IEC standard)	840 A
Starter type	12 V
Starter power	3 kW
Alternator type	14 V/80 A or 14 V/120 A
Current available on ISOBUS connector	50 A

Electronics	
DCC2	Instrument panel
4 AUTO 5 units	Transmission (x 2) Linkage Suspended axle
SB 23 Bosch valves	Electrohydraulic spool valves
1 Perkins ECM Tier 3	Engine
1 Sisu ECU Tier 3	-
1 Orbitrol Danfoss valve	-
Data 3	Onboard computer
Automatic air conditioning module	Air conditioning

Cab	
Type of cab available	Fixed or suspended
Type of rear-view mirror control available	Manual or electric
Type of air conditioning control available	Manual or automatic
Type and brand of air conditioning compressor	Sanden with axial pistons
Compressor displacement	154,9 cm ³ (9.45 in ³)/rev.
Refrigerant	R134a
Cab noise level	71 DBA
Roof type	Standard or High Visibility

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