Workshop Service Manual

MASSEY FERGUSON

MF 5700 SL series tractors

Beauvais
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MF 5700 SL series tractors

1. Introduction

1.1 MF 5700 SL - General

1.1.1 Using the manual

General

The purpose of this manual is to assist Dealers and Agents in the installation, servicing and repair of Massey Ferguson equipment. It is important to follow the methods shown and to use special tools in order to perform the operations within the times stated in the repair time schedule.

Structure of the manual

Contents

For quick reference, each chapter starts with a table of contents, listing the various sections included in that chapter.

Meaning of reference numbers

(...)	Reference number for parts

Service tools

Where the use of a service tool is necessary to carry out an operation, the tool reference is mentioned with the relevant instruction.

Tool drawings for makeshift tools are given at the end of the relevant sections.

Repairs and parts replacement

During replacement operations, using genuine Massey Ferguson parts is essential.

Fitting parts other than genuine Massey Ferguson parts invalidates the tractor warranty and tractor safety may be compromised. All Massey Ferguson parts are guaranteed by the manufacturer. Massey Ferguson Dealers and Agents are required to supply genuine parts.

For repairs and for fitting replacement parts and accessories, we draw your attention to the

following points in particular:

- Legislation in certain countries prohibits the fitting of parts that do not comply with the tractor manufacturer's specifications
- Torque wrench setting figures given in the workshop manual must be strictly respected
- Locking devices must be fitted where specified. If the efficiency of a locking device is impaired during disassembly, it must be replaced.

1.1.2 General specifications

1.1.2.1 MF 5700 SL models

Engine				
Model	**MF 5710 SL**	**MF 5711 SL**	**MF 5712 SL**	**MF 5713 SL**
Brand	AGCO Power			
Type	44 AWFC			
Nominal power hp ISO (kW) at an engine speed of 2200 rpm	95 (70)	105 (77)	115 (85)	125 (92)

Engine				
Model	**MF 5710 SL**	**MF 5711 SL**	**MF 5712 SL**	**MF 5713 SL**
Maximum power hp ISO (kW) at an engine speed of 2000 rpm	100 (74)	110 (81)	120 (88)	130 (96)
Maximum PTO power HP SAE (kW) at an engine speed of 2000 rpm	81 (60)	90 (66)	101 (75)	109 (80)
Maximum torque, Nm	420 Nm	468 Nm	502 Nm	545 Nm
Displacement in liters	4.4			
Piston travel	120 mm			
Piston diameter	108 mm			
Compression ratio	17,4 bar : 1 bar			
Number of cylinders	4			
Idle speed, hand brake engaged	750 rpm			
Idle speed, hand brake disengaged	850 rpm			
Nominal speed	2100 rpm			
Maximum speed	2260 rpm			
Engine weight	430 kg			
High-pressure pump brand	Bosch			
High-pressure pump type	CB18			
Firing order	1-2-4-3			
Maximum pressure in the high-pressure system	1800 bar			
Injector brand	Bosch			
Injector type	CRI 2.2			
Charge pump type	Manual			
Fuel prefilter filtration capacity	10 µ			
Main fuel filter filtration capacity	5 µ			
Low-pressure system pressure at minimum speed	0,5 bar to 1 bar			
Low-pressure system pressure at maximum speed	0,5 bar to 1 bar			
Recommended oil:	API CJ4 or ACEA E9			
Maximum operating tilt (precautions)	25° pitch			
	20° roll			

Engine				
Model	**MF 5710 SL**	**MF 5711 SL**	**MF 5712 SL**	**MF 5713 SL**
Oil/fuel consumption	Maximum 0.2%			
Lubrication system	Gear pump			
Oil cooling system	Oil/water heat exchanger			
Oil pressure at minimum speed	1,5 bar			
Oil pressure at maximum speed	2,5 bar at 5 bar depending on the temperature			
Relief valve adjustment pressure	5 bar (spring pressure)			
Air suction type	Turbocharged with air/air intercooler			
Air preheating type	Grid heater with relay controlled by the ECU			
Number of valves	16			
Valve clearance value	0,35 mm (inlet and exhaust)			
Engine cooling system	Coolant			
Fan type	Vistronic			
Thermostat begins to open at	83 °C			
Coolant temperature	-35 °C to 106 °C			
Air compressor brand for the brake system	Knorr Bremse			
Type of compressor	Piston			
Pressure range:	6,5 bar to 8 bar			
Block preheater	110 or 220 volts			
Fuel preheater	Not available			
Urea preheater	Tank: coolant			
Exhaust fumes recirculation system	Pump module and supply lines: electric			
DOC + SCR system (DEF or AdBlue™ injection)	DOC with metal substrate (exhaust fumes oxidation catalyzer)			
	SCR Technology with ceramic substrate (exhaust fume treatment)			
Safety system	NOx sensors at exhaust inlet and outlet			
Device brand	Bosch Denox 2.2+			
Type of control	Engine controller EEM4			
Urea solidification temperature	-11 °C			
Oil vapor recirculation system	Closed system breather (CCV)			

Engine				
Model	**MF 5710 SL**	**MF 5711 SL**	**MF 5712 SL**	**MF 5713 SL**
Belt: Air conditioning compressor/ left-hand alternator	Poly V belt			
Belt: Fan/right-hand alternator	Poly V belt			
Belt: Air compressor	Poly V belt			

Rear axle transmission	
Gearbox type	Dyna-4 GBA25 or Dyna-6 GBA25
Number of ratios	4
Number of ranges	4 or 6
Number of gears	16/16 or 24/24
Super creeper gears	13.68/1
Number of gears with super creeper gears	32/32
Maximum speed	40 km/h
Rear axle type	GPA54
Number of pinion/crown wheel teeth	10/47
Rear axle ratio	25.179
4WD ratio	0.775
Final drive type	GPA54
Final drive reduction ratio	(61+14)/14
Maximum 4WD clutch torque	180 daNm
Number of 4WD disks	6 disks
Main brake type	Multidisc ball ramp
Number of disks per side	5
Braking pressure	-
Parking brake type	Hand brake
Trailer brake type	Hydraulic and/or pneumatic with built-in antifreeze pump
Pneumatic trailer braking pressure	6,9 bar to 8,3 bar
Hydraulic trailer braking pressure	0 to 150 bar
Maximum operating tilt - pitch (front/rear)	25°
Maximum operating tilt - roll (right/left)	22°

Rear axle transmission	
Maximum operating tilt - combined	22°
Total loaded weight supported by rear axle	4-wheel drive: 6400 kg
	2-wheel drive: 6000 kg

Two-wheel drive front axle	
Front axle brand	LODI 140 CP

Four-wheel drive front axle	
Brand	DANA
Supplier reference - suspended axle	730/563
Supplier reference - fixed axle	730/563
Suspended front axle weight	-
Fixed front axle weight	278 kg
Number of differential disks	-
Total ratio for fixed and suspended front axle	14.57
Axle type	Suspended or fixed
Total loaded weight supported by front axle	-
Rotational direction	Anti-clockwise
Recommended oil type (beam and final drive)	SAE85W90 (API GL4-MIL L-2105)
Ratio for fixed and suspended axle final drive	6
Number of pinion/crown wheel teeth	14/34
Maximum steering angle	4-wheel drive: 55°
	2-wheel drive: 52°
Oscillation angle	± 9°
Type of oscillation stop	Mechanical
Suspension type	Hydraulics
Suspension ram diameter	2 mm x 45 mm/35 mm
Suspension ram stroke	140 mm
Hydraulic control unit brand	Husco
Hydraulic control unit nominal pressure	190 bar
Number of accumulators	2
Volume/pressure of accumulators	0,75 l : 70 bar

Four-wheel drive front axle	
	2 l : 40 bar
Suspension sensor type	Angular potentiometer.
Steering sensor type	Angular potentiometer.
Brake type	Combined with the rear brake
Factor K	1.339

Spool valves	
System type	Open Center (OC) 57 l/min or 100 l/min Closed Center Load Sensing (CCLS) 110 l/min
Flow rate	57 l/min or 100 l/min (OC) 110 l/min (CCLS)
High-pressure pump type	Bosch Rexroth gear pump(s) (OC) Bosch Rexroth piston pump (CCLS)
High-pressure pump displacement	19 cm3 (OC 57 l/min) 19 cm3 + 14 cm3 (OC 100 l/min) 45 cm3 (CCLS)
High-pressure pump rotational speed	3042 rpm (OC)
	865 rpm (CCLS)
High-pressure pump maximum flow rate	57 l/min or 100 l/min (OC) 110 l/min (CCLS)
High-pressure pump maximum pressure	200 bar
Maximum quantity of oil to add for heavy implements	25 l
Maximum exportable oil quantity (without adding oil)	24 l
Maximum exportable oil quantity (adding oil)	49 l
Charge pump type	Suction (OC) 60 cm3 gear pump (CCLS 110 l/min)
Main relief valve adjustment pressure	195 bar ± 5 bar (OC) 197 bar ± 5 bar (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 or 100 l/min (OC)

Spool valves	
	100 l/min (CCLS)
Spool valve control type	Mechanical
Recommended oil:	According to MF CMS M 1145 specification

Steering	
Steering type	Hydrostatic
Type of control	Steering wheel
Orbitrol displacement	2-wheel drive: 80 cm3
	4-wheel drive: 125 cm3
Steering ram diameter	2-wheel drive: 63 mm x 36 mm
	4-wheel drive: 70 mm x 40 mm
Steering ram stroke	2-wheel drive: 2 x 80 mm
	4-wheel drive: 2 x 108 mm
Working pressure	170 bar - 175 bar
Pressure relief valve adjustment pressure	170 bar - 175 bar
Shock valve adjustment pressure	225 bar - 245 bar
Oil recommended for steering	According to MF CMS M1145 specification

Rear linkage	
Lift ram diameter	85 mm
Linkage travel	737 mm
Maximum lifting capacity at ball joints	4206 kg
Working pressure	180 bar
3-point linkage category	CAT3

Front linkage	
Lift ram diameter	80 mm x 40 mm
Linkage travel	695 mm
Maximum lifting capacity at ball joints	2236 kg
Working pressure	190 bar
3-point linkage category	CAT2

Rear power take-off (PTO)	
Number of selections possible for rear PTO	540 540/540E 540/540E/1000
Maximum permissible power 540/540E in 1"3/8 (6 and 21 splines)	111 hp
Maximum permissible power 540/540E in 1"3/4 (20 splines)	56 hp
Maximum permissible power 1000 in 1"3/8 (6 and 21 splines)	111 hp
Maximum permissible power 1000 in 1"3/4 (20 splines)	111 hp
Engine speed for 540 PTO	1920 rpm
Engine speed for 540E PTO	1560 rpm
Engine speed for 1000 PTO	1964 rpm
Rotational direction	Clockwise
Clutch type	Multidisc hydraulic
Number of clutch disks	4
Control pressure	21 bar
Splined shaft type	6 and 21 in 1"3/8

Front power take-off	
Number of selections possible for front PTO	1000 rpm
Maximum permissible power	Anti-clockwise: 128 hp (94 kW)
Maximum permissible input-output torque	Anti-clockwise: 449 Nm - 898 Nm
Rotational direction	anti-clockwise
Engine speed if PTO 1000	2000 rpm
Ratio	2
Clutch type	Multidisc hydraulic
Splined shaft type	6 or 21 in 1"3/8

Electric	
Battery brand	TAB
Battery specifications (1 battery)	12 V - 105 A/h Type L5
Maximum current at start-up (SAE standard)	505A

Electric	
Starter type	12 V Iskra
Starter power	3.2 KW
Alternator type	1 x 120 A or 1 x 175 A
Current available on ISOBUS connector	Not available

Electronics	
Instrument panel	IC1
3 Autotronic 5 DC	Transmission/linkage/suspended front axle
Lighting/linkage controller	Management of the lighting and of the rear linkage
1 EEM4 (ECM Tier 4f AGCO Power)	Engine and SCR Denox 2.2+ system
1 Orbitrol Danfoss valve	Auto-Guide™/SpeedSteer function
Datatronic CCD	Onboard computer
Automatic air conditioning module	Air conditioning
CAN switches key pad	Controls for several tractor functions, such as 4WD, differential lock, high beam, Auto-Guide™, SpeedSteer.
AM50 unit	AgCommand™ (telemetry)

Cab and fittings	
Type of cab suspension available	Mechanical
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 cm3/rev.
Refrigerant	R134a
Cab noise level	71 DBA
Roof type	Standard High-visibility Flat

1.1.3 Forward speeds

1.1.3.1 Forward speed at 2200 rpm for models MF 5710 SL, MF 5711 SL, MF 5712 SL, MF 5713 SL and 16.9R34 tires

Forward and reverse travel, Dyna-4 transmission

Range	Ratio	GTA2550E	
		Without creeper gears engaged	With creeper gears engaged
1	A	1,93 km/h	0,14 km/h
1	B	2,38 km/h	0,17 km/h
1	C	2,90 km/h	0,21 km/h
1	D	3,57 km/h	0,26 km/h
2	A	4,59 km/h	0,34 km/h
2	B	5,64 km/h	0,41 km/h
2	C	6,88 km/h	0,50 km/h
2	D	8,47 km/h	0,62 km/h
3	A	9,32 km/h	0,68 km/h
3	B	11,46 km/h	0,84 km/h
3	C	13,98 km/h	1,02 km/h
3	D	17,19 km/h	1,26 km/h
4	A	21,50 km/h	1,57 km/h
4	B	26,44 km/h	1,93 km/h
4	C	32,25 km/h	2,36 km/h
4	D	39,66 km/h	2,90 km/h

Forward and reverse travel, Dyna-6 transmission

Range	Ratio	GTA2550	
		Without creeper gears engaged	With creeper gears engaged
1	A	1,50 km/h	0,11 km/h
1	B	1,80 km/h	0,13 km/h
1	C	2,11 km/h	0,15 km/h
1	D	2,55 km/h	0,17 km/h
1	E	2,99 km/h	0,22 km/h
1	F	3,60 km/h	0,26 km/h
2	A	4,05 km/h	0,30 km/h
2	B	4,88 km/h	0,36 km/h
2	C	5,72 km/h	0,42 km/h
2	D	6,88 km/h	0,50 km/h
2	E	8,10 km/h	0,59 km/h

Range	Ratio	GTA2550	
		Without creeper gears engaged	With creeper gears engaged
2	F	9,74 km/h	0,71 km/h
3	A	8,23 km/h	0,60 km/h
3	B	9,91 km/h	0,72 km/h
3	C	11,62 km/h	0,85 km/h
3	D	13,98 km/h	1,02 km/h
3	E	16,44 km/h	1,20 km/h
3	F	19,79 km/h	1,45 km/h
4	A	20,78 km/h	1,52 km/h
4	B	25,01 km/h	1,83 km/h
4	C	29,33 km/h	2,14 km/h
4	D	35,29 km/h	2,58 km/h
4	E	40 km/h [1]	3,03 km/h
4	F		3,65 km/h

[1] The speed is limited by the engine's electronic management system.

1.1.3.2 Forward speed at 2200 rpm for models MF 5710 SL, MF 5711 SL, MF 5712 SL, MF 5713 SL and 18.4R38 tires

Forward and reverse travel, Dyna-4 transmission

Range	Ratio	GTA2550E	
		Without creeper gears engaged	With creeper gears engaged
1	A	2,13 km/h	0,16 km/h
1	B	2,62 km/h	0,19 km/h
1	C	3,19 km/h	0,23 km/h
1	D	3,93 km/h	0,29 km/h
2	A	5,05 km/h	0,37 km/h
2	B	6,21 km/h	0,45 km/h
2	C	7,57 km/h	0,55 km/h
2	D	9,31 km/h	0,68 km/h
3	A	10,25 km/h	0,75 km/h
3	B	12,61 km/h	0,92 km/h
3	C	15,38 km/h	1,12 km/h
3	D	18,91 km/h	1,38 km/h
4	A	23,65 km/h	1,73 km/h
4	B	29,08 km/h	2,13 km/h
4	C	35,48 km/h	2,59 km/h
4	D	40 km/h [1]	3,19 km/h

[1] The speed is limited by the engine's electronic management system.

Forward and reverse travel, Dyna-6 transmission

Range	Ratio	GTA2550	
		Without creeper gears engaged	With creeper gears engaged
1	A	1,65 km/h	0,12 km/h
1	B	1,98 km/h	0,15 km/h
1	C	2,33 km/h	0,17 km/h
1	D	2,80 km/h	0,20 km/h
1	E	3,29 km/h	0,24 km/h
1	F	3,96 km/h	0,29 km/h
2	A	4,46 km/h	0,33 km/h
2	B	5,37 km/h	0,39 km/h
2	C	6,29 km/h	0,46 km/h
2	D	7,57 km/h	0,55 km/h
2	E	8,91 km/h	0,65 km/h
2	F	10,72 km/h	0,78 km/h
3	A	9,06 km/h	0,66 km/h
3	B	10,90 km/h	0,80 km/h
3	C	12,78 km/h	0,93 km/h
3	D	15,38 km/h	1,12 km/h
3	E	18,09 km/h	1,32 km/h
3	F	21,77 km/h	1,59 km/h
4	A	22,86 km/h	1,67 km/h
4	B	27,51 km/h	2,01 km/h
4	C	32,26 km/h	2,36 km/h
4	D	38,82 km/h	2,84 km/h
4	E	40 km/h[1]	3,34 km/h
4	F		4,02 km/h

[1] The speed is limited by the engine's electronic management system.

1.1.4 Dimensions and weights

1.1.4.1 Dimensions and weights

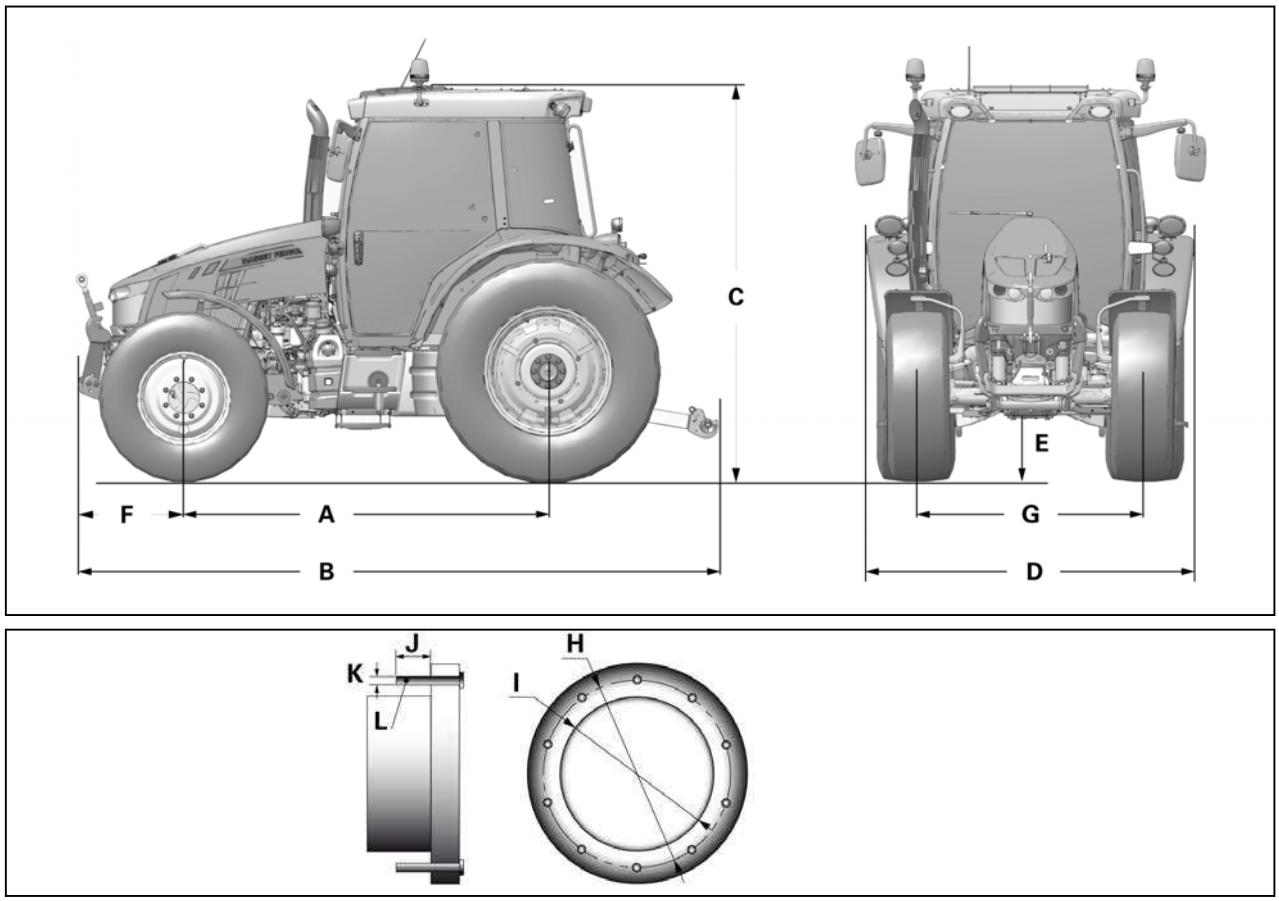

Fig. 1

General specifications: MF 5700 SL

Reference	Measured specification	Dimension/weight
(A)	Wheel base	2550 mm
(B)	External length with folded front linkage	4485 mm
	External length with horizontal front linkage	4490 mm
	External length without front linkage with weights	4805 mm
	External length without front linkage without weights	4355 mm
	External length without front linkage with hitch weight	4765 mm
(C)	Height to roof	
	Standard cab (add 208 mm for the rotary beacon on the roof):	1956 mm / 2035 mm
	High-visibility cab (add 185 mm for the rotary beacon on the roof):	1970 mm / 2049 mm

Reference	Measured specification	Dimension/weight
	Slimline cab (add 194 mm for the rotary beacon on the roof): Height at roof with Auto-Guide™	1866 mm to 1945 mm 2777 mm to 3007 mm
(D)	Maximum external width	2010 mm / 2300 mm
(E)	Ground clearance	240 mm to 315 mm
(F)	Front overhang: Without weights With weights With hitch weight With front linkage horizontal With front linkage folded With rear linkage horizontal	 605 mm 1015 mm 1055 mm 1140 mm 735 mm 1200 mm
	Tractor weight (with full fuel tank, without steel wheel weights) [1] 2-wheel drive 4-wheel drive	 Minimum 4300 Kg/Maximum 5800 Kg Minimum 4600 Kg/Maximum 5800 Kg
	Total loaded weight supported by rear axle - 40 km/h	7300 kg
	Total loaded weight supported by rear axle - 40 km/h	8500 kg

[1] Dimensions given vary according to tire assembly and the type of cab.

DANA 730 front axle

Reference	Measured specification	Front axle 730
(G)	Distance between flanges	1640 mm
(H)	Center-to-center distance between studs	275 mm
(I)	Centring diameter	220,8 mm
(J)	Stud length	34 mm
(K)	Stud diameter	M18 x 1.5
(L)	Number of studs	8

LODI 140 CP front axle

Reference	Measured specification	140 CP front axle
(G)	Distance between flanges	1506 mm to 2006 mm
(H)	Center-to-center distance between studs	152,4 mm
(I)	Centring diameter	117,42 mm

Reference	Measured specification	140 CP front axle
(J)	Screw length	NC
(K)	Screw diameter	M16 x 1.5
(L)	Number of screws	6

Rear axle

Reference	Measured specification	GPA54 rear axle
(G)	Distance between flanges for GPA 54	1680 mm
(H)	Center-to-center distance between studs	203,20 mm
(I)	Centring diameter	149,35 mm
(J)	Stud length	41 mm
(K)	Stud diameter	M18 x 1.5
(L)	Number of studs	8

1.1.5 Attachment points

1.1.5.1 Attachment points

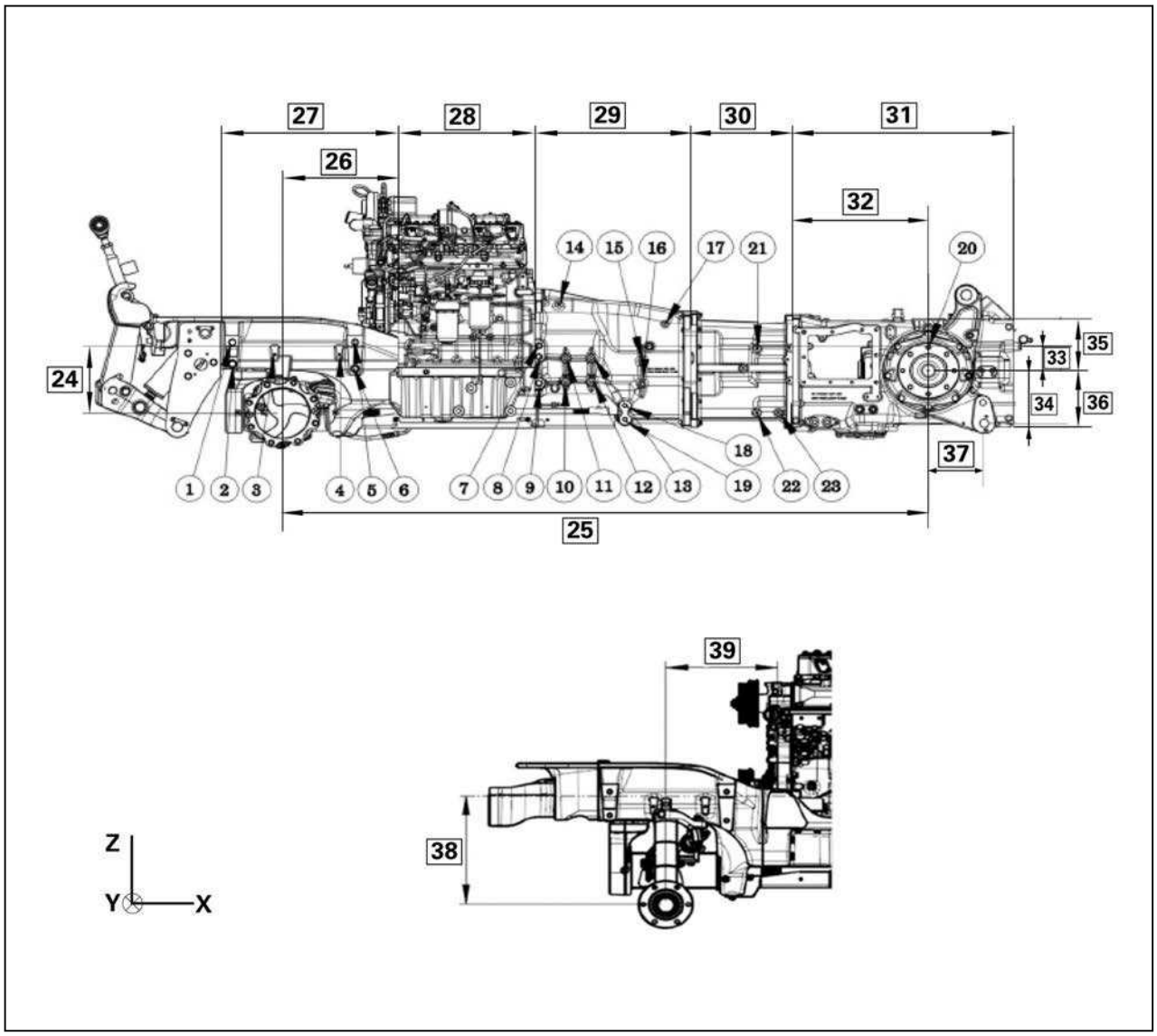

Fig. 2

NOTE: *Values x, y and z correspond to reference point 0 of the tractor (engine).*

Attachment points		X	Y	Z
(1)	M16x55	-1175 mm	-295 mm	18 mm
(2)	M16x55	-1175 mm	-260 mm	-78 mm
(3)	M8x16	-1008 mm	-260 mm	-35 mm
(4)	M8x16	-752 mm	-260 mm	-35 mm
(5)	M16x55	-692 mm	-295 mm	18 mm
(6)	M16x55	-692 mm	-260 mm	-98 mm
(7)	M16x75	35 mm	-225 mm	2,5 mm
(8)	M16x75	35 mm	-225 mm	-46 mm

Attachment points		X	Y	Z
(9)	M16x75	35 mm	-225 mm	-161 mm
(10)	M16x34	140 mm	-183 mm	-155 mm
(11)	M16x34	140 mm	-223 mm	-53 mm
(12)	M16x34	241 mm	-183 mm	-155 mm
(13)	M16x34	241 mm	-223 mm	-53 mm
(14)	M8x31	113 mm	-205 mm	183 mm
(15)	M16x34	441 mm	-228 mm	-65 mm
(16)	M16x34	441 mm	-228 mm	-165 mm
((17))	M8x23	532 mm	-200 mm	98 mm
(18)	M16x56	374 mm	-166 mm	-259 mm
(19)	M16x56	374 mm	-166 mm	-319 mm
(20)	8xM18	1571 mm	-840 mm	-4 mm
(21)	M16x26	894 mm	-185 mm	-12 mm
(22)	M16x26	894 mm	-157 mm	-290 mm
(23)	M16x26	980 mm	-157 mm	-290 mm

Dimensions	
(24)	292 mm
(25)	2549 mm
(26)	456 mm
(27)	698 mm
(28)	540 mm
(29)	616 mm
(30)	400 mm
(31)	872 mm
(32)	537 mm
(33)	106 mm
(34)	290 mm
(35)	228 mm
(36)	248 mm
(37)	220 mm
(38)	419 mm
(39)	379 mm

1.1.6 Capacities

1.1.6.1 Capacities

Type	Model	Capacity
Fuel tank	All models	180 l
Urea tank	All models	25 l
Cooling system	All models	13.7 l
Engine sump	All models	12 l
Transmission/rear axle	All models	Minimum 65 l Maximum 75 l Extra Maximum 90 l after adding 15 l for large implements or work on a 10 % slope.
Quantity to add for work on a slope or for large implements (maximum)	All models	15 l
Front axle beam	All models	5 l
Front final drive	All models	0,8 l
Front power take-off	All models	1,9 l
Refrigerant fluid R134A	Standard roof/flat roof High-visibility roof	900 g 1050 g
Windscreen washer bottle	All models	4 l

1.1.7 Tightening torques, retaining compounds and sealing products

1.1.7.1 Retaining compounds and sealing products

General

The Loctite compounds mentioned in this manual are referred to by their industrial name.

For repair purposes, use their commercial names or the corresponding Massey Ferguson references listed in the table below.

Loctite product type	Operation
221	Standard threadlock
241	
242	Medium threadlock
270	Strong threadlock
496	Glue (for metals)
510	Standard sealant
518	Sealant for flat surfaces and paper seals
542	Thread sealant
549	Oil-resistant surface sealant

Loctite product type	Operation
573	Surface sealant (engine, gearbox)
574	
577	Threaded union sealant (prevents loosening and leakages caused by vibrations)
603	Retainer for cylindrical assemblies (bearings, rings etc.)
638	Strong retainer for cylindrical assemblies (bearings, rings etc.)
648	Strong retainer for cylindrical assemblies (resistant to high temperatures)
706	Degreasing cleaner
5206	Metallic surface sealant (gearbox housing, engine sump)
5910	± Flexible surface sealant
5922	Sealant paste for ± flexible unions (sensor attachments etc.)
7100	Leakage detector for pneumatic systems

NOTE: *Use the product "Form A gasket 2" when sealing between plastic material and cast iron or steel.*

Application method for Loctite products

1. Remove all traces of previous sealants and corrosion
   - mechanically: wire brush or emery cloth
   - chemically: "DECAPLOC 88" (Leave the product to take effect then scrape off and wipe clean).
2. Degrease the components with dry solvent: preferably use "Super Solvant Sec LOCTITE 706".
3. Allow the solvents to evaporate
4. Apply the recommended type of LOCTITE product to the parts:
   - For all blind tapped holes, apply a quantity of the product to the last threads at the bottom of the hole.
   - for cylindrical fittings, apply the product on the two mating faces using a clean brush.
   - for mating faces, apply a bead to one of the two faces, circling the holes, and then tighten as quickly as possible.

NOTE:

- *Do not use too much of the compound, in order to avoid locking adjacent parts.*
- *Do not attempt to retighten after 5 minutes of curing, in order to avoid breaking the film of compound.*
- *If the ambient temperature is less than +10°C and to ensure quicker setting of Loctite products (except SILICOMET), use LOCTITE T 747 activator on at least one of the two parts after phase 2. Excess product outside the joint will not harden (anaerobic products — curing takes place only when there is no oxygen).*

Grease

When grease is used in components in contact with transmission oil, use grease that is miscible with oil to avoid blocking the hydraulic filters.

1.1.7.2 Tightening torques for screws and nuts

Use the tightening torques recommended for screws and nuts according to the tables below:

- 1 and 2 for metric threads
- 3, 4, 5 and 6 for threads in inches

When a specific torque is required, this is stated in the text.

Tables 1, 3 and 5 indicate the normal tightening torque values to apply to threaded zinc-plated elements, with normal nuts, coarse or fine threads, and with or without a flat washer or lock washer, and weldable nuts with a height greater than or equal to 0.8 d.

Tables 2, 4 and 6 indicate the reduced tightening torque values to apply to threaded elements in assemblies with zinc-plated self-locking locknuts, phosphated or zinc-flake-coated nuts or screws, thin nuts, weldable nuts with a height of less than 0.8 d.

To check these torque values, loosen the threaded element by one quarter turn and then retighten.

These values apply to dry assemblies. If the threads are oiled, reduce the tightening torques.

NOTE:
Read the tensile grade on the screw head and determine the corresponding torque to be applied.

1 - Tightening torque values: zinc dichromate-plated or white zinc-plated metric threads

Nominal dimension	**Tensile grade**		**Tensile grade**		**Tensile grade**	
	ISO 4.6 (SAE 1-BS B)		ISO 8.8 (SAE 5-BS S)		ISO 10.9 (SAE 8-BS V)	
	Torque		Torque		Torque	
	Min.	Max.	Min.	Max.	Min.	Max.
M3	0.5 Nm	0.7 Nm	1.3 Nm	1.7 Nm	1.8 Nm	2.4 Nm
M4	1.2 Nm	1.6 Nm	3.1 Nm	4.1 Nm	4.3 Nm	5.7 Nm
M5	2.2 Nm	3 Nm	6 Nm	8 Nm	8.5 Nm	11.5 Nm
M6	4 Nm	5 Nm	10 Nm	14 Nm	14 Nm	20 Nm
M8	9.5 Nm	12.5 Nm	25 Nm	35 Nm	36 Nm	46 Nm
M10	19 Nm	25 Nm	50 Nm	70 Nm	72 Nm	96 Nm
M12	33 Nm	43 Nm	90 Nm	120 Nm	120 Nm	160 Nm
M16	84 Nm	110 Nm	200 Nm	260 Nm	300 Nm	400 Nm
M20	160 Nm	210 Nm	420 Nm	560 Nm	600 Nm	800 Nm
M24	280 Nm	360 Nm	720 Nm	960 Nm	1000 Nm	1300 Nm
M30	540 Nm	720 Nm	1400 Nm	1800 Nm	2100 Nm	2800 Nm
M36	950 Nm	1250 Nm	2500 Nm	3300 Nm	3600 Nm	4800 Nm

2 - Reduced tightening torque values: phosphated or zinc-flake-coated metric threads

Nominal dimension	**Tensile grade**		**Tensile grade**		**Tensile grade**	
	ISO 4.6 (SAE 1-BS B)		ISO 8.8 (SAE 5-BS S)		ISO 10.9 (SAE 8-BS V)	
	Torque		Torque		Torque	
	Min.	Max.	Min.	Max.	Min.	Max.
M3	0.4 Nm	0.6 Nm	1 Nm	1.4 Nm	1.5 Nm	1.9 Nm
M4	1 Nm	1.3 Nm	2.5 Nm	3.3 Nm	3.4 Nm	4.6 Nm
M5	1.8 Nm	2.4 Nm	4.8 Nm	6.4 Nm	6.8 Nm	9.2 Nm

M6	3.2 Nm	4 Nm	8 Nm	11 Nm	12 Nm	16 Nm
M8	7.6 Nm	10 Nm	20 Nm	28 Nm	29 Nm	37 Nm
M10	15 Nm	20 Nm	40 Nm	56 Nm	57 Nm	77 Nm
M12	26 Nm	34 Nm	72 Nm	96 Nm	100 Nm	130 Nm
M16	68 Nm	88 Nm	160 Nm	210 Nm	240 Nm	320 Nm
M20	130 Nm	170 Nm	340 Nm	450 Nm	480 Nm	640 Nm.
M24	230 Nm	290 Nm	570 Nm	770 Nm	800 Nm	1040 Nm
M30	430 Nm	570 Nm	1100 Nm	1400 Nm	1700 Nm	2200 Nm
M36	760 Nm	1000 Nm	2000 Nm	2600 Nm	2900 Nm	3800 Nm

3 - Tightening torque values: zinc dichromate-plated or white zinc-plated threads in inches

Nominal dimension	**Tensile grade**		**Tensile grade**		**Tensile grade**	
	SAE 1 (ISO 4.6-BS B)		SAE 5 (ISO 8.8-BS S)		SAE 8 (ISO 10.9-BS V)	
	Torque (Nm)		Torque (Nm)		Torque (Nm)	
	Min.	Max.	Min.	Max.	Min.	Max.
#6	0.9	1.3	1.8	2.4	2.5	3.3
#8	1.7	2.3	3.4	4.4	4.7	6.3
#10	2.5	3.3	4.7	6.3	6.7	8.9
1/4	6	8	11	15	16	22
5/16	12	16	22	30	31	(43)
3/8	22	30	(39)	53	55	75.
7/16	35	(47)	64	86	90;	120
1/2	54	72	100	130	140	180
5/8	110	140	200	260	280	370
3/4	190	250	350	460	490	660
7/8	310	410	560	760	800	1060
1	460	620	840	1120	1200	1600
1 1/8	480	640	1050	1390	1700	2200
1 1/4	680	900	1500	2000	2400	3200
1 1/2	1200	1600	2600	3400	4100	5400

4 - Reduced tightening torque values: phosphated or zinc-flake-coated threads in inches

Nominal dimension	Tensile grade		Tensile grade		Tensile grade	
	SAE 1 (ISO 4.6-BS B)		SAE 5 (ISO 8.8-BS S)		SAE 8 (ISO 10.9-BS V)	
	Torque (Nm)		Torque (Nm)		Torque (Nm)	
	Min.	Max.	Min.	Max.	Min.	Max.
#6	0.7	1	1.5	1.9	2	2.6
#8	1.4	1.8	2.7	3.5	3.8	5
#10	2	2.6	3.8	5	5.3	7.1
1/4	4.8	6.4	8.8	12	13	18
5/16	9.6	13	18	24	25	34
3/8	18	24	31	42	(44)	60
7/16	28	38	51	69	72	96
1/2	(43)	57	80	104	110	140
5/8	90;	110	160	210	220	300
3/4	150	200	280	370	390	530
7/8	250	330	450	610	640	850
1	370	500	670	900	960	1280
1 1/8	390	510	840	1100	1360	1760
1 1/4	540	720	1200	1600	1920	2560
1 1/2	960	1300	2100	2700	3280	4320

5 - Tightening torque values: zinc dichromate-plated or white zinc-plated threads in inches

Nominal dimension	Tensile grade		Tensile grade		Tensile grade	
	SAE 1 (ISO 10.9-BS B)		SAE 5 (ISO 8.8-BS S)		SAE 8 (ISO 10.9-BS V)	
	Torque lbf ft		Torque lbf ft		Torque lbf ft	
	Min.	Max.	Min.	Max.	Min.	Max.
#6	0.6	1	1.3	1.8	1.8	2.4
#8	1.3	1.7	2.5	3.2	3.4	4.6
#10	1.8	2.4	3.4	4.6	4.9	6.6
1/4	4.4	5.9	8	11	12	16
5/16	9	12	16	22	23	31
3/8	16	22	29	(39)	(41)	55
7/16	26	35	(47)	63	66	88
1/2	(40)	53	74.	96	100	130
5/8	81	103	150	190	210	270

3/4	140	180	260	340	360	490
7/8	230	300	410	560	590	780
1	340	460	620	830	880	1180
1 1/8	350	470	775	1025	1200	1600
1 1/4	500	660	1100	1470	1800	2400
1 1/2	880	1180	1900	2500	3000	4000

6 - Reduced tightening torque values: phosphated or zinc-flake-coated threads in inches

Nominal dimension	**Tensile grade**		**Tensile grade**		**Tensile grade**	
	SAE 1 (ISO 10.9-BS B)		SAE 5 (ISO 8.8-BS S)		SAE 8 (ISO 10.9-BS V)	
	Torque lbf ft		Torque lbf ft		Torque lbf ft	
	Min.	Max.	Min.	Max.	Min.	Max.
#6	0.5	0.8	1	1.4	1.5	1.9
#8	1	1.4	2	2.6	2.7	3.7
#10	1.5	1.9	2.7	3.7	3.9	5.3
1/4	3.5	4.7	6.6	8.8	9	13
5/16	7	9.4	13	18	18	25
3/8	13	18	23	31	32	(44)
7/16	20	28	37	51	53	71
1/2	32	42	59	77	82	106
5/8	65	83	120	150	160	220
3/4	110	150	210	270	290	390
7/8	180	240	330	450	470	630
1	270	370	500	660	710	940
1 1/8	280	380	620	820	1000	1300
1 1/4	400	530	880	1180	1400	1900
1 1/2	700	940	1500	2000	2400	3200

1.1.7.3 Tightening torques for hydraulic unions

Use the tightening torques recommended for hydraulic unions according to the tables below:

- 1 for hydraulic unions with 37° flare
- 2 for EO2 hydraulic unions
- 3 for hydraulic unions with metric straight thread
- 4 for hydraulic unions with straight thread in inches
- 5 for steel unions with sealed thread.

When a specific torque is required, this is stated in the text.

The specifications for these tightening torques apply to zinc-plated steel unions used with hoses and rigid hydraulic pipes that ideally include straight thread unions, unions with 37° flare or unions with an "O" ring for bosses.

These values apply to dry assemblies. If the threads are oiled, reduce the tightening torques.

1 - Tightening torques: hydraulic unions with 37° flare

Tensile grade SAE J 514				
Outside diameter of pipe, metric	**Outside diameter of pipe, in inches**	**Thread**	**Torque**	
mm	inch	inch	Min.	Max.
4	1/8	5/16 - 24 UNF	8 Nm	9 Nm
5	3/16	3/8 - 24 UNF	11 Nm	12 Nm
6	1/4	7/16 - 20 UNF	15 Nm	16 Nm
8	5/16	1/2 - 20 UNF	19 Nm	21 Nm
10	3/8	9/16 - 18 UNF	24 Nm	28 Nm
12	1/2	3/4 - 16 UNF	49 Nm	53 Nm
16	5/8	7/8 - 14 UNF	77 Nm	85 Nm
20	3/4	1-1/16 - 12 UN	107 Nm	119 Nm
22	7/8	1-3/16 - 12 UN	127 Nm	140 Nm
25	1	1-5/16 - 12 UN	147 Nm	154 Nm
32	1-1/4	1-5/8 - 12 UN	172 Nm	181 Nm
(40)	1-1/2	1-7/8 - 12 UN	215 Nm	226 Nm
50	2	2-1/2 - 12 UN	332 Nm	350 Nm

IMPORTANT:
The unions for pipes must not be tightened using a pipe wrench or a torque wrench. Special pipe wrenches, flat open-end wrenches and Allen keys of the appropriate size must be used to avoid crushing the pipes and unions and tearing the threads.

2 - Tightening torques: EO2 hydraulic unions

Pipe dimension	**Torque +10%**
mm	
6 x 1	17 Nm
8 x 1	25 Nm
10 x 1	35 Nm
12 x 1	45 Nm
12 x 1.5	48 Nm
15 x 1.5	70 Nm
18 x 2	105 Nm

22 x 2	160 Nm
25 x 2	210 Nm
28 x 2	205 Nm

3 - Tightening torques: hydraulic unions with metric straight thread

Tensile grade ISO 6149-3	
Thread	**Torque +10% / 0%**
mm	Nominal
M8 x 1	8 Nm
M10 x 1	15 Nm
M12 x 1.5	25 Nm
M14 x 1.5	35 Nm
M16 x 1.5	40 Nm
M18 x 1.5	45 Nm
M22 x 1.5	60 Nm
M27 x 2	100 Nm
M33 x 2	160 Nm
M42 x 2	210 Nm
M48 x 2	260 Nm
M60 x 2	315 Nm

4 - Tightening torques: hydraulic unions with straight thread in inches

Tensile grade SAE J 514		
Thread	**Torque**	
Inch	Min.	Max.
5/16 - 24 UNF	8 Nm	9 Nm
3/8 - 24 UNF	11 Nm	12 Nm
7/16 - 20 UNF	18 Nm	20 Nm
1/2 - 20 UNF	23 Nm	26 Nm
9/16 - 18 UNF	29 Nm	33 Nm
3/4 - 16 UNF	49 Nm	53 Nm
7/8 - 14 UNF	59 Nm	64 Nm
1-1/16 - 12 UN	93 Nm	102 Nm
1-3/16 - 12 UN	122 Nm	134 Nm

1-5/16 - 12 UN	151 Nm	166 Nm
1-5/8 - 12 UN	198 Nm	218 Nm
1-7/8 - 12 UN	209 Nm	231 Nm
2-1/2 - 12 UN	296 Nm	325 Nm

5 - Tightening torques: steel unions with sealed thread

Nominal diameter of pipe	**Torque**	
inch	Min. [1]	Max.
1/8	20 Nm	30 Nm
1/4	40 Nm	50 Nm
3/8	60 Nm	80 Nm
1/2	110 Nm	140 Nm
3/4	160 Nm	200 Nm
1	210 Nm	270 Nm
1-1/4	250 Nm	310 Nm

[1] The minimum values of tightening torques are not applicable if a sealing product is used.

Application of the sealing product on the sealed threads

- Apply the sealing product to the length (A).
- Do not apply sealing product to the first two threads (B).

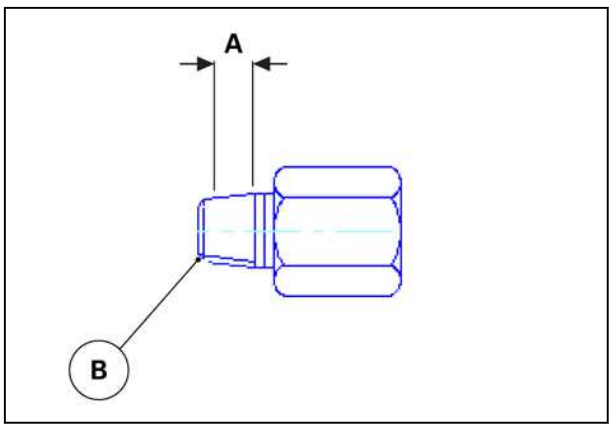

Fig. 3

1.1.8 Units of measurement

1.1.8.1 Conversion table

Length		
mm	x 0.0394	in
in	x 25.400	mm
m	x 3.2808	ft
ft	x 0.3048	m
km	x 0.6214	mile
mile	x 1.6093	km