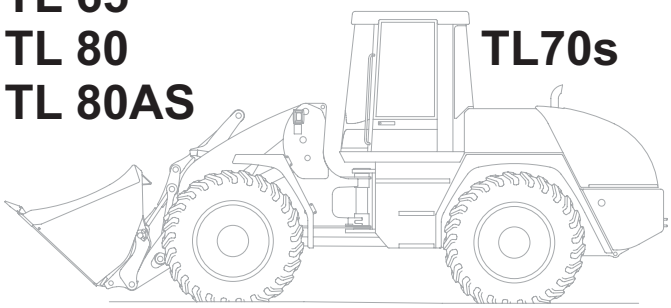
TEREX®

SERVICE - MANUAL

TL 60
TL 65
TL 80
TL 80AS

SKL 200

TL70s



TL 100 TL 120 TL 160
TL 210 TL 260 TL 310

TW 70
TW 85
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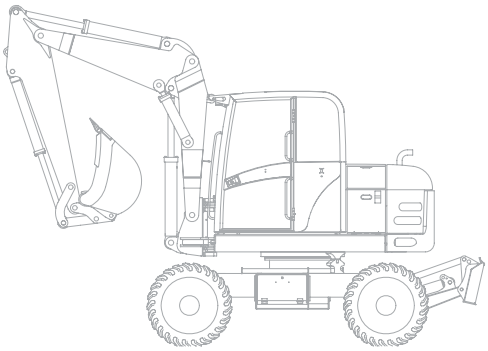

TC 60
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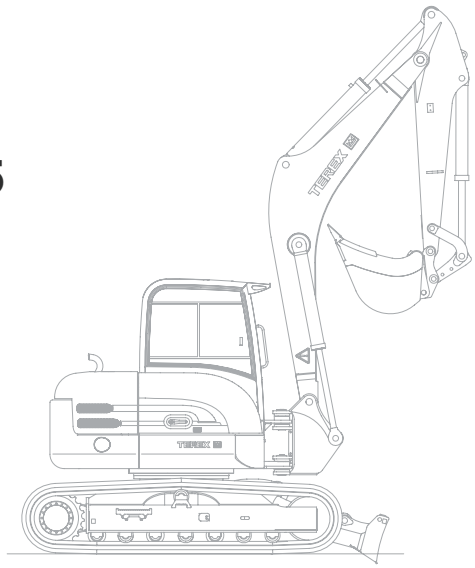

TC 29
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01.2012

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In this Service Manual the individual components of the Terex construction machinery range as well as the functions and adjustments of the aggregates installed are described.

The hydraulic and electrical diagrams as well as cut-off views in connection with the operating manual and parts catalogue are to facilitate the repair and maintenance work.

We have purposely left out assembly and working steps as major repairs are normally carried out by experienced and qualified workshop personnel familiar with these type of repairs.

When carrying out a repair, safety and cleanliness at the workplace are essential. The use of excellent tools and the replacement of sealing parts at every repair should be self-evident.

Unless any special values are indicated, screw fittings are to be tightened using correct torque specifications.

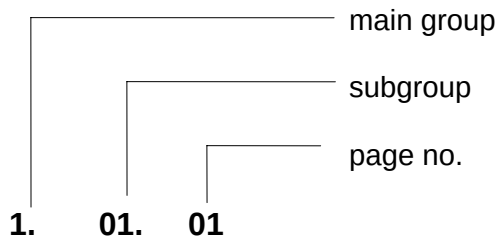
This Service Manual is issued by the Customer Service Department of Messrs. Terex. It is to develop the after-sales service of Terex construction machinery together. The Service Bulletins we issue for your information can serve as a supplement.

This Manual is kept up-to-date through periodic supplements.

The Service Manual is subdivided into main groups, subgroups and page numbers so that you can easily find special groups and pages.

This structuring will also facilitate the filing of revised versions and supplements within the framework of the technical alteration service.

E.g.



For the division of the main groups, please refer to the list of contents.
The subgroup division is done starting from the main group.
The page number follows the subgroup and main group number.

Please strictly follow the regulations for Accident Prevention valid in your country (see also 1.20).

The best safety measure to avoid accidents is to be careful when carrying out repairs. We therefore recommend to carefully study the corresponding information referring to the repair you intend to do.

Any maintenance and repair work on machines located in the field may only be performed when the work equipment is lowered to the ground, the engine is switched off, the machine is secured so that it cannot roll, and the hydraulic system is relieved.

If qualified personnel perform repair work in the workshop, the relevant Accident Prevention Regulations also apply.

Safety and Accident Prevention

1 Introductory remarks

Please read the operating instructions carefully before putting an earth-moving machine into operation and strictly follow the following remarks for a safe operation.

National safety regulations - e.g. the Accident Prevention Regulations, “Earth-Moving Machinery” (VBG 40) and “Vehicles” (VBG 12) in the Federal Republic of Germany - must also be complied with.

In addition to the operating instructions, legal regulations governing road traffic and road safety measures must also be observed. Such requirements could also apply in respect of handling hazardous goods or the wearing of personal safety equipment, for example.

Furthermore, safety laws governing work in particular locations (tunnels, adits, quarries, pontoons, contaminated areas, etc.) must likewise be observed.

2 Correct use

The earth-moving machine with normal shovel equipment is only to be used for work which is suitable for the machine’s functions and its attachment.

Such work includes the digging, loading, displacing and dumping out of earth, stones or other materials and the loading of these materials onto lorries, conveyor belts or other means of transportation. The transport of the loading material, however, is mainly carried out by moving the earth-moving machine.

If special attachments, such as Uni-shovel, side dump shovel, sweeper, fork lift attachment etc. are mounted, special jobs can be done with the attachment.

Another or additional application, e.g. for transportation of passengers or using the lifting device as working platform etc. is not considered as correct use. The supplier is not liable for subsequent damage. The enduser himself bears the full risk.

It is part of the correct use to follow the operating and maintenance instructions and to carry out the maintenance as well as to follow the maintenance intervals.

3 General safety notes

It is important to refrain from any working methods which impair safety.

The earth-moving machine may only be used when it is in a safe, operational condition.

The manufacturer’s operating instructions must be complied with for operation, maintenance, repair, assembly and transportation.

The plant operator must provide additional special safety instructions, wherever necessary, for specific local conditions.

The operating instructions and any information pertaining to safety must be carefully kept in the driver’s cab.

The operating instructions and safety notes must be complete and fully readable.

Safety devices on earth-moving machines must not be deactivated or removed.

during operation. Rings, scarves and unbuttoned jackets are to be avoided. Protective goggles, protective boots, helmets, gloves, reflecting jackets, ear-muffs, etc. may be required.

Before commencing work, information must be obtained on first aid and possible means of rescue (ambulance, fire brigade, helicopters).

A check must be carried out to ensure that the first aid box is at hand and that its contents comply with regulations.

Personnel must be aware of the location and method of operation of the fire extinguishers on the earth-moving machine as well as on-site fire-warning and fire-fighting equipment.

Loose parts such as tools or other accessories must be secured to the earth-moving machine.

Open doors, windows, covers, flaps, etc. must be secured so that they cannot slam shut.

4 Operation

Earth-moving machines may only be independently operated and serviced by people who

- are physically and mentally fit
- have been instructed in the operation or maintenance of the earth-moving machine and have demonstrated this ability to the plant operator
- can be expected to perform their allocated duties reliably

All these people must be of the legal minimum age.

They must be designated by the plant operator to operate or service the earth-moving machine.

Operating equipment (controls) may only be activated from the driver's seat.

The earth-moving machine may only be ascended and entered using the entrances and surfaces intended for this purpose.

The operator has to ensure that the cab, steps and other walked-on surfaces of the earth-moving machine are free of dirt, grease, oil, ice and snow.

5 Danger zone

•No one may enter the danger zone of earth-moving machines.

•The danger zone encompasses the area around the earth-moving machine in which people may be injured by movements of the earth-moving machine during operation, its working equipments and attachments, or by swinging out or falling loads, or by falling working equipment.

•The machine operator may only work with the earth-moving machine when the danger zone is free of personnel.

•The machine operator must give a warning signal to persons who may be in danger.

•The machine operator has to stop work with the earth-moving machine if anyone remains in the danger zone despite the warning.

•To ensure no danger of crushing, a sufficient safety distance (min. 500 mm) must be kept from solid objects, e.g. buildings, excavation slopes, scaffolding, other machines, etc.

If the above safety distance cannot be maintained, the area between solid objects and the working zone of the earth-moving machine must be blocked off.

•If conditions are such that the machine operator's view of the driving and working zone is restricted, he must be guided or the driving and working zone must be marked by a solid barricade.

The windows must be clean and free of ice.

Driving tracks must be designed so as to ensure smooth, safe operation, i.e. they must be sufficiently wide, on ground which has sufficient carrying capacity and as few slopes as possible.

Downhill tracks must be set out in such a way that loading machines can be braked safely.

6 Transport of passengers

Passengers must not be transported on the machine.

7 Stability

Earth-moving machines must be used, driven and operated in such a manner that their stability against overturning is ensured at all times.

The machine operator must drive at speeds which are suitable for local conditions.

The permitted payload of the earth-moving machine must not be exceeded.

Earth-moving machines must remain at a sufficient distance from the edges of quarries, pits, mounds and slopes to ensure there is no risk of falling.

Earth-moving machines must be secured so that they cannot roll or slip when in the vicinity of excavations, shafts, ditches, pits and slopes.

8 Travel operation

Before putting the earth-moving machine into operation, the driver's seat, mirrors and controls must be so adjusted as to ensure safe working.

The carrying capacity of bridges, cellar roofs, vaults, etc. must be verified before the earth-moving machine can drive over them.

The internal dimensions of constructions must be noted before entering underground passages, tunnels, etc.

On steep drops and uphill gradients, the load must be carried on the uphill side, if possible, in order to increase stability.

Before driving downhill, the appropriate gear for the terrain must be selected and the gear lever must not be moved during downhill travel (normal or crawler gear).

Earth-moving machines may only be driven on the open road when both the machine and the driver have the appropriate licence as required by the country in question.

Outside areas covered by general traffic regulations, e.g. on construction sites, traffic regulations should be applied in the proper manner. This should also apply with regard to drivers' licences.

9 Operation

The operator has to check the correct fastening of the attachments and / or lock of the quick exchange device daily before start of operation and after every attachment change. Move the attachment carefully at low height. Please ensure that nobody is in the danger zone during these checks.

The machine operator may only swing the working equipment over occupied drivers' seats, operator consoles and workplaces of other machines if these are protected by overhead guards (FOPS).

If a cab does not have the required protection, the driver of this vehicle must leave the driver's seat when the working equipment has to be slewed overhead.

The vehicles must be loaded in such a manner as to ensure that there is no overloading and no material can be lost during travel. The vehicle must be loaded from the lowest possible height.

At dumping points, earth-moving machines may only be operated when suitable measures have been taken to prevent rolling or falling.

10 Guides

Guides must be easily recognizable, e.g. by means of reflective clothing. They must remain within the machine operator's field of sight.

While guiding the machine, guides must not be given other jobs which may distract them from their task.

11 Danger of falling objects

Earth-moving machines may only be used where there is a danger of falling objects if the driver's seat and operator consoles have an overhead guard (FOPS). A front guard must be employed if there is a risk of materials breaking into the cab.

In front of walls e.g. of stacked materials, earth-moving machines must be positioned and operated in such a way that the driver's seat and entry to the driver's seat are not situated on the side facing the wall.

Demolition work may only be performed with earth-moving machines where there is no danger to personnel.

12 Working in the vicinity of underground power lines

Before commencing excavating work using earth-moving machines, it must be determined whether any underground power lines are present in the intended working zone which may present a danger to personnel.

If underground power lines are present, their exact position and course must be determined in consultation with the proprietor or operator of the lines, and the necessary safety precautions decided and implemented.

The course of power lines in the work area must be clearly marked, under supervision, before commencing any excavation work. If the position of lines cannot be determined, search ditches must be dug - manually, if needed.

If underground power lines are encountered unexpectedly or they or their protective covers are damaged, the machine operator must discontinue work immediately and notify the supervisor.

13 Working in the vicinity of overhead power lines

When the earth-moving machine is being used in the vicinity of overhead power lines and trolley wires, a safety distance which varies depending upon the nominal voltage of the overhead line must be maintained between the lines and the earth-moving machine and its working equipment, in order to prevent current overspill. This also applies to the distance between these lines and attached implements or loads.

The safety distances specified below must be complied with:

Nominal voltage	Safety distance in metres
- 1000 V	1.0 m
over 1 kV - 110 kV	3.0 m
over 110 kV - 220 kV	4.0 m
over 220 kV - 380 kV	5.0 m
nom. voltage unknown	5.0 m

In the observation of safety distances, all working movements of the earth-moving machine, e.g. positions of the boom, swinging ropes and the dimensions of attached loads must be taken into consideration. Uneven ground which would cause the earth-moving machine to be inclined and thus nearer to overhead lines must also be taken into account.

During work in windy conditions, both overhead lines and working equipment may swing out, thus reducing the safety distance.

If it is impossible to maintain sufficient distance from overhead power lines and trolley wires, the plant operator must consult with the proprietor or operator of the overhead lines to find other safety precautions to prevent current overspill. Such measures could be, e.g.

- Switching off the current
- Re-routing the overhead line
- Cabling, or
- Limiting the work zone of earth-moving machines.

14 Operation in closed rooms

If earth-moving machines are used in closed rooms, these areas must be sufficiently ventilated and special regulations observed.

15 Work stoppages

Before rest periods and at the end of the working day, the driver of the earth-moving machine must park the machine on ground with sufficient load capabilities and is as even as possible, and must secure it against movement.

Before rest periods and at the end of the working day, the driver must lower the working equipment onto the ground or secure it so that it cannot move about.

The driver must not leave the earth-moving machine if the working equipment has not been lowered to the ground or secured.

Earth-moving machines may only be parked in places where they do not present an obstacle, e.g. on the construction site or to plant traffic. Warning devices, e.g. triangles, warning cordons, flashing or hazard lights are to be used if necessary.

Before leaving the control console, the driver must bring all working equipment into home position and apply the brakes.

If the driver is leaving the earth-moving machine unattended, he must first turn off the drive motors and ensure that they cannot be started up by unauthorized persons (remove ignition key for example).

16 Crane operations

Crane operations are the hoisting, transporting and lowering of loads with the aid of a fixing device (rope, chain, etc.), whereby the assistance of personnel is required to attach and release the load.

Such work covers, for example, the lifting and lowering of pipes, heavy machine parts or containers with earth-moving machines.

Earth-moving machines may only be used for crane operations if the prescribed safety devices are present and in full working order. For earth-moving machines, these are:

- Safe fastening points for lifting device
- Table of carrying capacity
- Overload warning device*
- Hose rupture safety valve for boom cylinder*

*only in case of an admissible carrying capacity of more than 1000 kg

Loads must be attached in such a way that they cannot slip or fall out.

Personnel guiding the machine and attaching loads must always remain in the machine operator’s field of sight.

The machine operator must carry loads as close to the ground as possible and prevent them from swinging.

Earth-moving machines may only travel with an attached load if the path of travel is fairly level.

When earth-moving machines are used for crane operations, personnel attaching loads may only approach the boom from the side and with the machine operator’s permission. The machine operator may only give his permission if the earth-moving machine is standing still and the working equipment is not in motion.

Do not use fixing devices (ropes, chains) which are damaged or of inadequate dimensions. Protective gloves must always be worn when working with fixing devices.

17 Assembly, maintenance, repair

Earth-moving machines may only be assembled, converted or disassembled under the guidance of a suitable person designated by the plant operator and following the manufacturer's operating instructions.

After every change of attachment, the operator has to ensure the correct fastening and / or lock of the quick exchange device.

Work on braking, steering, hydraulic and electric systems of the earth-moving machine may only be carried out by expert personnel specially trained in these areas.

Stability must be ensured at all times during work on earth-moving machines.

The working equipment must be secured against movement by lowering them to the ground or equivalent measures, e.g. stays, trestles. When the engine is running, the insecured articulation area of loaders with articulated steering must not be entered.

When jacking up earth-moving machines, jacking devices must be positioned so that they cannot slip. Jacks must be positioned and applied absolutely straight, without tilting.

Raised earth-moving machines must be supported by suitable structures such as crosswise stacks of planks, square timbers or steel trusses.

Earth-moving machines which are raised with working equipment must be stabilized by a supporting structure immediately after lifting. Do not work under earth-moving machines which are only supported by the hydraulics.

The engine/motor must be turned off prior to all maintenance and repair work. These requirements may only be ignored in the case of maintenance or repair work which cannot be performed without the engine/ motor running.

Depressurize the hydraulic system when carrying out maintenance and repair jobs. To do this, lower the working equipment to the ground with the engine turned off and operate all hydraulic control levers until the hydraulic system is depressurized.

Before working on the electrics or when performing arc-welding on the machine, the connection to the battery must be interrupted.

When disconnecting the battery, first the negative pole then the positive pole must be disconnected. The battery must be re-connected in reverse order.

During repair work around the battery, the battery must be covered with insulating material; tools should never be placed on or near the battery.

Protective devices of moving machine parts may only be opened or removed when the drive has been switched off and cannot be switched on again by unauthorized persons. Protective devices are e.g. engine/motor covers, doors, protective grating, trim.

Upon completion of assembly, maintenance or repair work, all protective devices must once more be attached in the proper manner.

Load-bearing parts of earth-moving machines may only be welded following consultation with the manufacturer and in accordance with recognized welding principles.

Overhead guards (FOPS) must not be welded or drilled in any way which could impair their sturdiness.

Alterations, such as welding of the hydraulic system, may only be undertaken with the manufacturer's permission.

Before commencing work on the hydraulic system, the pilot pressure, back pressure and pressure inside the tank must be let off.

Lubricants cannot be taken internally and repeated skin contact should be avoided. There is no special danger to health if lubricants are used correctly. Please follow the safety recommendations issued by the mineral oil companies.

Only the hoses specified by the manufacturer may be used.

Hydraulic hoses must be routed and assembled by expert personnel.

Never smoke or handle open flames near or around the fuel tank and batteries.

18 Towing, loading, transportation

The towing of earth-moving machines may only be done with towing devices sufficiently dimensioned.

The fixing devices specified by the manufacturer must be employed.

For loading and transportation, earth-moving machines and all necessary auxiliary equipment must be secured against unwanted movement.

The travelling gear and track-laying gear of earth-moving machines must be sufficiently cleaned of mud, snow and ice to ensure that ramps can be driven up without risk of slipping.

When the earth-moving machine is transported on lorries, flat-bed trailers or by rail, it has to be carefully secured with wheel chocks and tie-downs at the fastening points.

Before setting off, the route to be taken must be examined to determine whether the roads are wide enough, entrances and passages under bridges are large enough and that roads and bridges have sufficient carrying capacity.

19 Monitoring and inspections

The machine must be thoroughly inspected by an authorized and trained person according to the safety regulations valid in your country:

- prior to the first commissioning and prior to re-commissioning after major changes
- at least once a year
- periodically according to the operating conditions and the conditions in the operator's company

The inspection report is to be put in writing and kept for future reference.

Furthermore, prior to each work shift, the machine operator must check the earth-moving machine according to the inspection chart.

Hydraulic hoses must be replaced as soon as the following damages are recognized:

- Damages to the outer layer which reach the intermediate layer
- Embrittled patches on the outer layer
- Deformations when under pressure or without pressure which differ from the original shape of the installed hose
- Leakages
- Damages to hose fittings or to the connection between the fitting and the hose

The coolant level must only be checked when it has cooled down; the cap must be turned carefully in order to bleed off excess pressure.

Prior to operations, the machine operator must check the function of the safety devices.

The machine operator must advise the supervisor immediately - and the person relieving him, should there be a change of operators - with regard to any shortcomings.

In the event of shortcomings which jeopardize the operating safety of the earth-moving machine, it must not be used until these have been eliminated.

20 Fire protection

A fire extinguisher has to be stored in the operator's cab. A fire extinguisher symbol has to be applied.

21 Emergency exit

The windscreen acts as an emergency exit. If a front guard is fitted or this exit can no longer be used for any other reason, an emergency hammer must be affixed at an easily accessible place inside the driver's cab.

22 Other dangers

Failure of the hydraulics

If the hydraulic system fails due to a standstill of the diesel engine, a defectiveness of the hydraulic pump or a hydraulic oil leakage, only the **emergency** functions **„lower working equipment"** are possible.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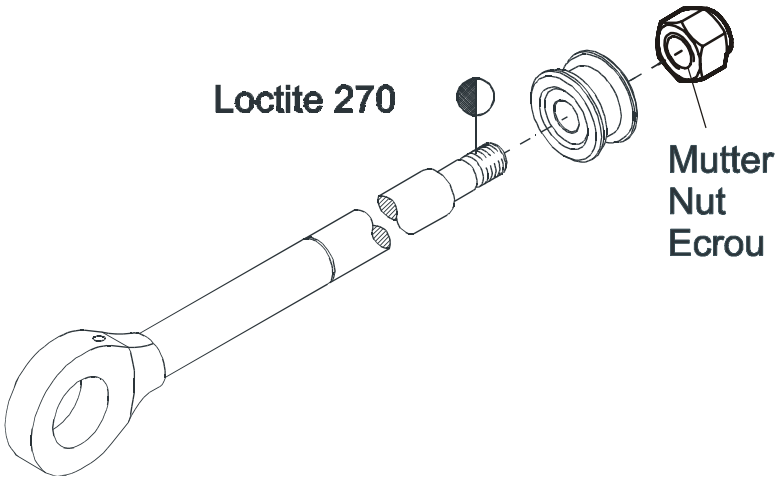
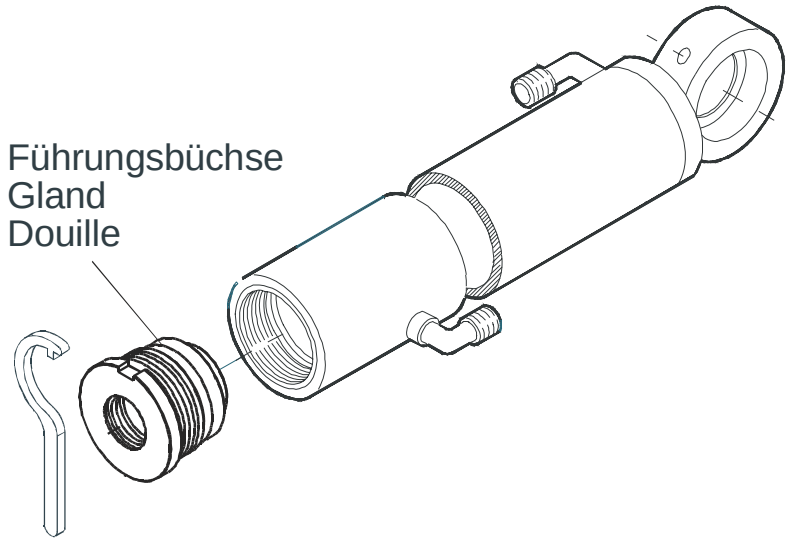


Gewinde Kolbenmutter Thread of nut Filetage d'écrou	Anziehdrehmoment Nm Tightening torques Nm Couples de serrage Nm
M 18x2	200
M 20x2	260
M 22x2	410
M 24x2	450
M 27x2	810
M 30x2	1050
M 35x1,5	730
M 36x2	1075
M 36x3	1550
M 39x3	1700
M 40x1,5	730
M 42x2	1400
M 42x3	1850
M 48x3	2050
M 56x2	1600
M 60x2	1800
M 70x2	2500
M 80x2	2900
M 90x2	3200



Hydraulikzylinder ∅ **Hydraulic cylinder ∅** **Vérin hydraulique ∅**	**Gewinde - Führungsbüchse** **Thread - Bushing** **Filetage - Douille**	**Anziehdrehmomente Nm** **Tightening torques Nm** **Couples de serrage Nm**
35/45	M50x2	200 - 230
50	M56x2	230 - 265
55	M60x2	250 - 290
63	M68x2	290 - 335
70	M75x2	330 - 380
70	M80x2	360 - 415
80	M85x2	390 - 450
90	M95x2	450 - 520
95	M100x2	480 - 550
100	M105x2	520 - 600
105	M110x2	550 - 635
110	M115x2	590 - 680
115	M120x2	630 - 725
125	M130x2	690 - 795

Pictograms

001 - 099 General control

100 - 119 Loader

120 - 139 Excavator

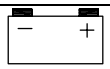
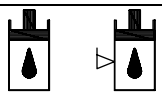
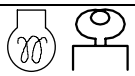
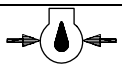
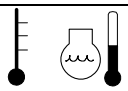
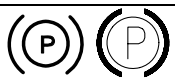
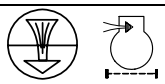
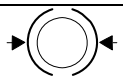
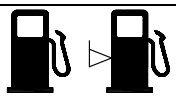
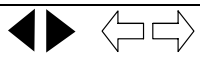
140 - 149 Backhoe excavator

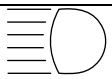
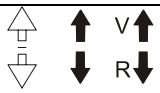
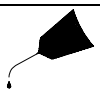
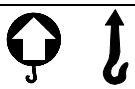
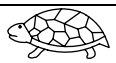
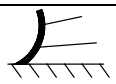
150 - 159 Universal-mounted excavator / loader

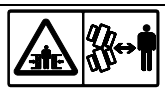
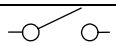
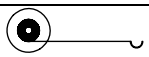
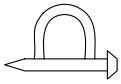
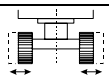
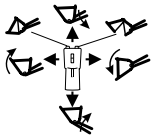
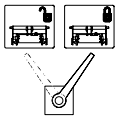
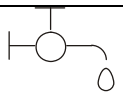
160 - 179 Walking excavator

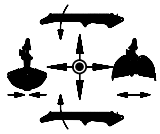
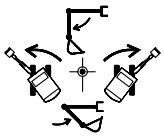
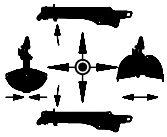
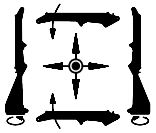
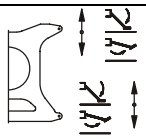
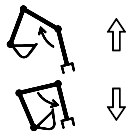
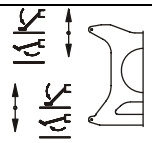
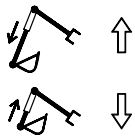
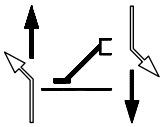
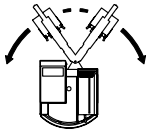
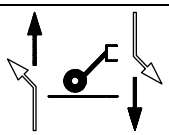
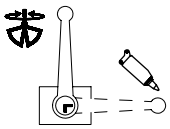
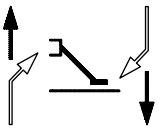
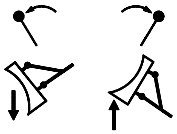
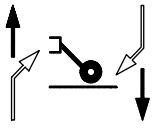
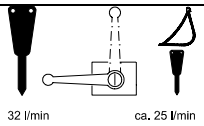
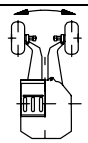
180 - 199 Tunnelling and mining machines / Rail-road excavator

200 - Maintenance, safety, etc. in general

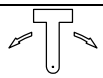
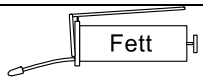
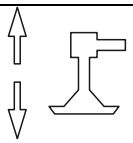
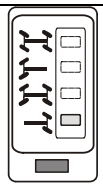
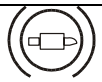
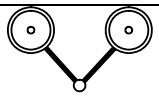
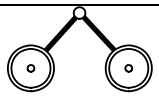
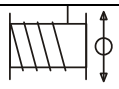
	Symbol	Description		Symbol	Description
001		Battery charge indicator	**012**		Hydraulic oil, hydraulic oil level
002		Pre-heat	**013**		Hydraulic oil temperature
003		Engine oil pressure	**014**		Hydraulic oil filter clogging indicator
004		Engine oil temperature	**015**		Horn
005		Engine oil level	**016**		Operational status, operating hours
006		Coolant temperature	**017**		Parking brake
007		Coolant level	**018**		Brake accumulator pressure
008		Air filter	**019**		Excavator brake
009		Fuel, fuel level	**020**		Service brake
010		Fan, Heater / ventilation	**021**		Hazard warning system
011		Windscreen wash/ wipe system	**022**		Direction indicator, left/right

	Symbol	Description		Symbol	Description
023		Working floodlights	**039**		Speed control
024		Upper beam indicator	**040**		Oscillating axle lock
025		Direction of travel forward/reverse	**041**		Steering inversion
026		Rotating beacon	**042**		All-wheel steering crab / round steer
027		Light, lower beam	**043**		Rocker pedal for travel
028		Central grease system	**044**		Only shift when machine is at standstill
029		Lashing points	**045**		High gear
030		Overload warning device / Overload warning indicator	**046**		Cabin lift / lower
031		Suspension point for loading by crane	**047**		Steering control display
032		Travel speed, fast	**048**		First aid kit
033		Travel speed, slow	**049**		Fire extinguisher
034		Working hydraulics cut-off, excavator; loader / crane	**050**		Switch-over monitor for operating hours and time
035		Unlocked	**051**		Swing limitation, engine stop override
036		Locked	**052**		Switch for all-wheel steering
037		Float position	**053**		Interior lighting
038		Dozer blade	**054**		Reset hydraulic pulley block (crane)

	Symbol	Description		Symbol	Description
055		Quick movement hoisting winch	**071**		Danger of crushing
056		Cable uncoil limit switch	**072**		Danger of injury
057		Auxiliary winch	**073**		Observe notes in operating instructions
058		Magnet system	**074**		
059		Hydraulic rock breaker	**075**		Linde - no load automatics
060		Electric boom height limitation	**076**		Remote control
061		Undercarriage-adjustment	**077**		Warning - general
062		Switch-over swing speed, engine speed adjustment	**078**		Temperature - General
063		Free fall mode	**079**		
064		Grab rotation	**080**		
065		Bucket return positioning, lifting frame height limitation	**100**		Control by Joystick
066		Ride control system	**101**		
067		Bucket return positioning	**102**		Quick mount-hitch lock
068		Hydraulic oil level	**103**		
070		Safety distance, see item 202	**104**		Water pump for sweeper

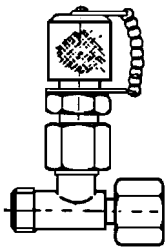
	Symbol	Description		Symbol	Description
105		Warning lamp gearbox	**151**		Universal-mounted excavator/ loader (AL) controls ISO control system right
120		Control ISO control system-left Schaeff control system-right	**152**		Universal-mounted excavator/ loader (AL) controls Schaeff control system left
121		Control ISO control system right	**153**		Universal-mounted excavator/ loader (AL) controls Schaeff control system right
122		Control Schaeff control system left	**154**		Universal-mounted excavator/ loader (AL) controls Outrigger right
123		Control Intermediate boom (articulated boom type)	**155**		Universal-mounted excavator/ loader (AL) controls Outrigger left
124		Control telescopic stick in / out	**160**		Control Outrigger leg left
125		Control articulation „Knickmatik“	**161**		Control Wheel outrigger - left
126		Switch-over rock breaker / grapple	**162**		Control Outrigger leg right
127		Control dozer blade	**163**		Control Wheel outrigger - right
128		Switch-over (HR 12) Bucket - rocker breaker small / rock breaker big	**164**		Steering
140		Shifting of slide bearing	**165**		Wheel lock (HS 41)
150		Universal-mounted excavator/ loader (AL) controls ISO control left	**166**		Free wheel (HS 41 M)

	Symbol	Description		Symbol	Description

167		Outriggers spread	**200**		Grease gun
168		Outriggers lift / lower	**201**		Danger
169		Steering mode switch HS 41 MM	**202**		On the machine: caution, safety distance In the operating manual: warning
170		Outrigger left	**203**		Note
171		Outrigger right	**204**	**R**	Soot filter
180	D	Switch-over diesel drive	**205**		Particle filter
181		Switch-over electric drive			
182	START	Diesel engine ignition lock			
183		Pony truck IN			
184		Pony Truck OUT			
185	START E-Motor	Electric motor START			
186	Not-Aus E-Motor	Electric motor emergency OFF			
187		Cable drum (cable winch)			


TEREX

Minimum basic equipment

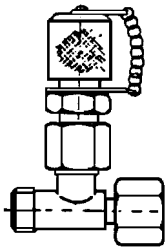


test port 8 L
part no. **5 066 234 200**

screwed fitting ELSD 8 L
part no. **1 919 060 351**

2 X

pilot pressure
“working hydraulics“
control pressure
“travel hydraulics“
etc.



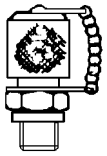
test port 10 L
part no. **5 066 234 230**

screwed fitting ELSD 10 L
part no. **1 919 060 352**

1 X

brake pressure

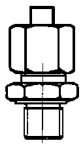
etc.



test port M 12x1,5
part no. **5 066 253 605**
seal ring 18x12x1,5
part no. **1 636 815 453**

2 X

control pressure
regulation start
housing pressure
“travel hydraulics“
etc.



nut 8 L
part no. **1 911 060 154**
plug
part no. **1 928 000 944**
screwed fitting G 8 L
part no. **1 915 000 418**

1 X

brake inching

etc.

Measuring hoses (Minimeß)

L = 2000mm part no. 5 066 253 600
L = 3200mm part no. 5 066 314 040
L = 6000mm part no. 5 066 314 070
L = 2500mm part no. 5 066 314 010
L = 5000mm part no. 5 066 314 055


TEREX

1.650.01 Drift Values

Drift values in mm / minute

Machinery type	Lift cylinder	Tilt cylinder
TL 65	***3,0***	***5,5***
TL 70	***3,0***	***5,5***
TL70s		
TL 80	***3,0***	***5,5***
TL80 AS		
TL 100	***3,5***	***6,0***
TL 120	***3,5***	***6,0***
TL 160	***3,5***	***3,0***
TL 210		
TL 260	***3,5***	***3,0***
TL 310		

Machinery type	Boom cylinder	Intermediate boom cylinder	Dipper stick cylinder
TW 70 GA	***3,0***	***3,0***	***4,0***
TW 85 Mono	***3,5***		***5,5***
TW 85 GA+Ci	***3,5***	***2,5***	***5,5***
TW 110 GA	***3,0***	***2,5***	***5,0***
TC 60 Mono	***3,0***		***3,0***
TC 75 Mono	***3,5***		***5,5***
TC 75 Ci	***3,5***	***2,5***	***5,5***
TC 125 GA	***3,0***	***2,5***	***5,0***
TC 125 Mono	***3,0***		***5,0***

Drift values in mm / minute

Machinery type	Boom cylinder	Intermediate boom cylinder	Dipper stick cylinder
TC 15	***5,0***		***6,5***
TC 16	***5,0***		***6,5***
TC 16 Twin Drive	***5,0***		***6,5***
TC 20	***5,0***		***6,5***
TC 25	***2,0***		***2,0***
TC 29	***4,0***		***7,0***
TC 35	***4,0***		***7,0***
TC 37	***4,0***		***6,5***
TC 48	***3,0***		***3,0***
TC 50			

Test conditions

1. Hydraulic oil temperature approx. 50 - 60 °C.
2. Fit test port with gauge on the cylinder.
3. Retract and extend cylinder several times and operate working equipment to its maximum reach until the gauge indicates a load pressure of 100 bar (if necessary charge with weight).
4. Measure piston rod length of cylinder
5. Measure piston rod length again after 5 minutes
6. The difference converted into 1 minute is the drift of the cylinder
7. The values indicated are valid for hydraulic oil 10 W 40 (viscosity at 50°C approx. 35 mm2/s (cST)

There may be differences if hydraulic oil with a different specification is used.

Temp. °C	Temp. °F	Temp. °C	Temp. °F
-19	-2,20	21	69,80
-18	-0,40	22	71,60
-17	1,40	23	73,40
-16	3,20	24	75,20
-15	5,00	25	77,00
-14	6,80	26	78,80
-13	8,60	27	80,60
-12	10,40	28	82,40
-11	12,20	29	84,20
-10	14,00	30	86,00
-9	15,80	31	87,80
-8	17,60	32	89,60
-7	19,40	33	91,40
-6	21,20	34	93,20
-5	23,00	35	95,00
-4	24,80	36	96,80
-3	26,60	37	98,60
-2	28,40	38	100,40
-1	30,20	39	102,20
0	32,00	40	104,00
1	33,80	50	122,00
2	35,60	60	140,00
3	37,40	70	158,00
4	39,20	80	176,00
5	41,00	90	194,00
6	42,80	100	212,00
7	44,60	110	230,00
8	46,40	120	248,00
9	48,20	130	266,00
10	50,00	140	284,00
11	51,80	150	302,00
12	53,60	200	392,00
13	55,40	300	572,00
14	57,20	400	752,00
15	59,00	500	932,00
16	60,80	600	1112,00
17	62,60	700	1292,00
18	64,40	800	1472,00
19	66,20	900	1652,00
20	68,00	1000	1832,00

Temp. °F	Temp. °C	Temp. °F	Temp. °C
-19	-28,33	21	-6,11
-18	-27,78	22	-5,56
-17	-27,22	23	-5,00
-16	-26,67	24	-4,44
-15	-26,11	25	-3,89
-14	-25,56	26	-3,33
-13	-25,00	27	-2,78
-12	-24,44	28	-2,22
-11	-23,89	29	-1,67
-10	-23,33	30	-1,11
-9	-22,78	31	-0,56
-8	-22,22	32	0,00
-7	-21,67	33	0,56
-6	-21,11	34	1,11
-5	-20,56	35	1,67
-4	-20,00	36	2,22
-3	-19,44	37	2,78
-2	-18,89	38	3,33
-1	-18,33	39	3,89
0	-17,78	40	4,44
1	-17,22	50	10,00
2	-16,67	60	15,56
3	-16,11	70	21,11
4	-15,56	80	26,67
5	-15,00	90	32,22
6	-14,44	100	37,78
7	-13,89	110	43,33
8	-13,33	120	48,89
9	-12,78	130	54,44
10	-12,22	140	60,00
11	-11,67	150	65,56
12	-11,11	200	93,33
13	-10,56	300	148,89
14	-10,00	400	204,44
15	-9,44	500	260,00
16	-8,89	600	315,56
17	-8,33	700	371,11
18	-7,78	800	426,67
19	-7,22	900	482,22
20	-6,67	1000	537,78

Kilometers per hour (km/h)	Miles per hour (mph)	Kilometers per hour (km/h)	Miles per hour (mph)
1	0,6	110	68,3
2	1,2	120	74,5
3	1,9	130	80,7
4	2,5	140	87,0
5	3,1	150	93,2
6	3,7	160	99,4
7	4,3	170	105,6
8	5,0	180	111,8
9	5,6	190	118,0
10	6,2	200	124,2
20	12,4	210	130,4
30	18,6	220	136,6
40	24,8	230	142,9
50	31,1	240	149,1
60	37,3	250	155,3
70	43,5	260	161,5
80	49,7	270	167,7
90	55,9	280	173,9
100	62,1	290	180,1

Miles per hour (mph)	Kilometers per hour (km/h)	Miles per hour (mph)	Kilometers per hour (km/h)
1	1,6	110	177,1
2	3,2	120	193,2
3	4,8	130	209,3
4	6,4	140	225,4
5	8,1	150	241,5
6	9,7	160	257,6
7	11,3	170	273,7
8	12,9	180	289,8
9	14,5	190	305,9
10	16,1	200	322,0
20	32,2	210	338,1
30	48,3	220	354,2
40	64,4	230	370,3
50	80,5	240	386,4
60	96,6	250	402,5
70	112,7	260	418,6
80	128,8	270	434,7
90	144,9	280	450,8
100	161,0	290	466,9

bar	PSI
1	14,50
2	29,01
3	43,51
4	58,02
5	72,52
6	87,02
7	101,53
8	116,03
9	130,53
10	145,04
20	290,08
30	435,11
40	580,15
50	725,19
60	870,23
70	1015,26
80	1160,30
90	1305,34
100	1450,38
110	1595,41
120	1740,45
130	1885,49
140	2030,53
150	2175,57
160	2320,60
170	2465,64
180	2610,68
190	2755,72
200	2900,75

bar	PSI
210	3045,79
220	3190,83
230	3335,87
240	3480,90
250	3625,94
260	3770,98
270	3916,02
280	4061,06
290	4206,09
300	4351,13
310	4496,17
320	4641,21
330	4786,24
340	4931,28
350	5076,32
360	5221,36
370	5366,39
380	5511,43
390	5656,47
400	5801,51
410	5946,55
420	6091,58
430	6236,62
440	6381,66
450	6526,70
460	6671,73
470	6816,77
480	6961,81
490	7106,85

Cubic meter (m^3)	Cubic feet (ft^3)	Cubic yards (yd^3)	Cubic feet (ft^3)	Cubic yards (yd^3)	Cubic meter (m^3)	Cubic yards (yd^3)	Cubic meter (m^3)	Cubic feet (ft^3)
0,1	3,53	0,13	1	0,04	0,03	0,1	0,08	2,70
0,2	7,06	0,26	2	0,07	0,06	0,2	0,15	5,40
0,3	10,59	0,39	3	0,11	0,08	0,3	0,23	8,10
0,4	14,13	0,52	4	0,15	0,11	0,4	0,31	10,80
0,5	17,66	0,65	5	0,19	0,14	0,5	0,38	13,50
0,6	21,19	0,78	6	0,22	0,17	0,6	0,46	16,20
0,7	24,72	0,92	7	0,26	0,20	0,7	0,54	18,90
0,8	28,25	1,05	8	0,30	0,23	0,8	0,61	21,60
0,9	31,78	1,18	9	0,33	0,25	0,9	0,69	24,30
1	35,31	1,31	10	0,37	0,28	1	0,76	27,00
2	70,63	2,62	20	0,74	0,57	2	1,53	54,00
3	105,94	3,92	30	1,11	0,85	3	2,29	81,00
4	141,26	5,23	40	1,48	1,13	4	3,06	108,00
5	176,57	6,54	50	1,85	1,42	5	3,82	135,00
6	211,89	7,85	60	2,22	1,70	6	4,59	162,00
7	247,20	9,16	70	2,59	1,98	7	5,35	189,00
8	282,52	10,46	80	2,96	2,27	8	6,12	216,00
9	317,83	11,77	90	3,33	2,55	9	6,88	243,00
10	353,15	13,08	100	3,70	2,83	10	7,65	270,00
20	706,29	26,16	200	7,41	5,66	20	15,29	540,00
30	1059,44	39,24	300	11,11	8,50	30	22,94	810,00
40	1412,59	52,32	400	14,81	11,33	40	30,58	1080,00
50	1765,74	65,40	500	18,52	14,16	50	38,23	1350,00
60	2118,88	78,48	600	22,22	16,99	60	45,87	1620,00
70	2472,03	91,56	700	25,93	19,82	70	53,52	1890,00
80	2825,18	104,64	800	29,63	22,65	80	61,16	2160,00
90	3178,33	117,72	900	33,33	25,49	90	68,81	2430,00
100	3531,47	130,80	1000	37,04	28,32	100	76,46	2700,00

Newton per meter (Nm)	Pound per Inch (lbf/in)	Pound per foot (lbf/ft)	Pound per Inch (lbf/in)	Pound per foot (lbf/ft)	Newton per meter (Nm)	Pound per foot (lbf/ft)	Newton per meter (Nm)	Pound per Inch (lbf/in)
1	8,86	0,74	1	0,08	0,11	1	1,36	12,00
2	17,71	1,48	2	0,17	0,23	2	2,71	24,00
3	26,57	2,21	3	0,25	0,34	3	4,07	36,00
4	35,42	2,95	4	0,33	0,45	4	5,42	48,00
5	44,28	3,69	5	0,42	0,56	5	6,78	60,00
6	53,13	4,43	6	0,50	0,68	6	8,13	72,00
7	61,99	5,16	7	0,58	0,79	7	9,49	84,00
8	70,84	5,90	8	0,67	0,90	8	10,85	96,00
9	79,70	6,64	9	0,75	1,02	9	12,20	108,00
10	88,55	7,38	10	0,83	1,13	10	13,56	120,00
20	177,10	14,75	20	1,67	2,26	20	27,12	240,00
30	265,65	22,13	30	2,50	3,39	30	40,67	360,00
40	354,20	29,50	40	3,33	4,52	40	54,23	480,00
50	442,75	36,88	50	4,17	5,65	50	67,79	600,00
60	531,30	44,25	60	5,00	6,78	60	81,35	720,00
70	619,86	51,63	70	5,83	7,91	70	94,91	840,00
80	708,41	59,00	80	6,67	9,03	80	108,47	960,00
90	796,96	66,38	90	7,50	10,16	90	122,02	1080,00
100	885,51	73,76	100	8,33	11,29	100	135,58	1200,00
200	1771,01	147,51	200	16,67	22,59	200	271,16	2400,00
300	2656,52	221,27	300	25,00	33,88	300	406,75	3600,00
400	3542,03	295,02	400	33,33	45,17	400	542,33	4800,00
500	4427,54	368,78	500	41,67	56,46	500	677,91	6000,00
600	5313,04	442,54	600	50,00	67,76	600	813,49	7200,00
700	6198,55	516,29	700	58,33	79,05	700	949,07	8400,00
800	7084,06	590,05	800	66,67	90,34	800	1084,65	9600,00
900	7969,57	663,81	900	75,00	101,64	900	1220,24	10800,00
1000	8855,07	737,56	1000	83,33	112,93	1000	1355,82	12000,00

Liter	gal (US)
1	0,26
2	0,53
3	0,79
4	1,06
5	1,32
6	1,59
7	1,85
8	2,11
9	2,38
10	2,64
20	5,28
30	7,93
40	10,57
50	13,21
60	15,85
70	18,49
80	21,13
90	23,78
100	26,42
200	52,83
300	79,25
400	105,67
500	132,09
600	158,50
700	184,92
800	211,34
900	237,75
1000	264,17

gal (US)	Liter
1	3,79
2	7,57
3	11,36
4	15,14
5	18,93
6	22,71
7	26,50
8	30,28
9	34,07
10	37,85
20	75,71
30	113,56
40	151,42
50	189,27
60	227,12
70	264,98
80	302,83
90	340,69
100	378,54
200	757,08
300	1135,62
400	1514,16
500	1892,71
600	2271,25
700	2649,79
800	3028,33
900	3406,87
1000	3785,41

Tightening torque TL 65 - 70s - TL80 - TL100

Note: When using Loctite thread lock, make sure that the threads are clean and free of grease and oil.

Pump attachment:	**Bolt/screw type:**	**Torque:**
Clutch on Flywheel	M8 8.8 (8x)	25 Nm
Clutch hub on pump shaft	thread pin M12x22	50 Nm
Pump flange on clutch housing	M10 8.8 (12x)	46 Nm
Travel pump on pump flange	M16 8.8 (2x)	170Nm
Loader pump on travel pump	M10 (Allen screw 8.8) (2x)	45 Nm
Loader pump on travel pump (TL100)	M12 x35 8.8 (2x)	80 Nm

Front axle:		
Front axle on front carriage	M20x90 8.8 (8x)	395 Nm
Internal gear of planetary gear on axle	M10 12.9	79 Nm

Drum Brake:		
Brake support on axle	M12 (Allen screw 10.9)	115 Nm

Disc Brake:		
Brake support on axle	M14 10.9	185 Nm
Brakedisc on cardan shaft	M10 10.9	17 Nm
Brake calliper (Park and Service) on support	M16	310 Nm

Attention, check Axletype and Version!

APR 715 or 720	**Version:**	
Drive Flange on king pinion	Bolt M20x1,5 12.9	400 Nm
	or	
	Locknut	600 Nm

MTL3015 or 3020	**Version:**	
Drive flange on king pinion	Locknut 24x2	450 Nm

Rear axle:	**Bolt/screw type:**	**Torque:**
King pin on Rear carriage: Flange bolts:	M12 “Verbus-Rip” 	
replace by Flange bolts:	M12x40 (2x) M12x50 (4x) **8.8** (use Nordlock washers Part No: 1 990 707 023 to make sure that the bolt can´t come loose)	79 Nm
Internal gear of planetary gear on axle	M10 12.9	79 Nm

Cardan shaft:	**Bolt/screw type:**	**Torque:**
Flange bolts front axle	M8 10.9	37Nm
Flange bolts rear axle	M10 10.9	67Nm

Wheeles:		
Wheel nuts (TL65)	M18x1,5	325 Nm
Wheel nuts	M20x1,5	460 Nm

Articulation:		
Cover of swing bearing (TL65)	M10x25 8.8	46 Nm
Cover of swing bearing	M10x35 10.9 (Allen screw)	69 Nm
Bolts of steering cylinder pins	M12x30 8.8 (+ Loctite 242)	80 Nm

Swing Loader TL70s:	**Bolt/screw type:**	**Torque:**
Swing bearing of loading frame	M16x60 10.9 (18x / 9x)	330 Nm

Hydraulic cylinders: **Piston nut :** **Guide bushing:**

Steering cylinder (all Models) M22x2 410Nm + Loctite 242 390-450Nm

Only for machines with parallel kinematic:

TL65:		
Lifting cylinder	M36x2 1550Nm + Loctite 242	M95x2 450-520 Nm
Shovel cylinder	M27x2 810Nm + Loctite 242	M85x2 390-450 Nm
TL70s:		
Lifting cylinder	M27x2 810Nm + Loctite 242	M85x2 390-450 Nm
Shovel cylinder	M27x2 810Nm + Loctite 242	M95x2 450-520 Nm
TL80:		
Lifting cylinder	M42x3 1850Nm + Loctite 242	M110x2 550-635 Nm
Shovel cylinder	M30x2 1050Nm + Loctite 242	M95x2 450-520 Nm
TL100:		
Lifting cylinder	M42x3 1850Nm + Loctite 242	M120x2 630-725 Nm
Shovel cylinder	M36x3 1550Nm + Loctite 242	M110x2 550-635 Nm

Hyraulic cylinder nuts/wrench size/torque table				
Thread size:	Part Number nut:	Wrench size:	Torque:	Add loctite 242:
M18x2	1 212 251 817	27 mm	200 Nm	yes
M22x2	1 212 251 819	32 mm	410 Nm	yes
M24x2	1 212 251 821	36 mm	450 Nm	yes
M27x2	1 212 251 824	41 mm	810 Nm	yes
M30x2	1 212 251 826	46 mm	1050 Nm	yes
M36x3	1 212 251 832	55 mm	1550 Nm	yes
M39x3	1 212 251 834	60 mm	1700 Nm	yes
M42x3	1 212 251 836	65 mm	1750 Nm	yes
M48x3	1 212 251 840	75 mm	1800 Nm	yes

Tightening torque TL210 - TL260 (from TL02600135)

Note: When using Loctite thread lock, make sure that the threads are clean and free of grease and oil.

Pump attachment:	**Bolt/screw type:**	**Torque:**
Clutch on Flywheel	3/8“-16UNC-11/4“ (8X)	40 Nm
Clutch hub on pump shaft	Thread pin M14x16	70 Nm
Pump flange on clutch housing	M10x35 8.8 (12x)	30 Nm
Travel pump on pump flange	M20x45 8.8 (4x)	380 Nm
Loader pump on travel pump	M16x45 8.8 (2x)	115 Nm
Front axle:		
Front axle on front carriage	M30x2x280 8.8 (8x)	1500 Nm
Internal gear of planetary gear	mount with Loctite 242	1st step 330 Nm 2nd step 385 Nm
Drive flange cardan shaft on pinion shaft	mount with Loctite 242 (resulting in 120-180Ncm rolling moment)	880-1100Nm
Differential housing	mount with Loctite 242	78 Nm
Axle flared tube		300 Nm
Rear axle:		
Rear axle support frame on rear carriage	M30x150 10.9 (4x)	2000 Nm
Internal gear of planetary gear on axle	mount with Loctite 242	1st step 330 Nm 2nd step 385 Nm
Differential housing	mount with Loctite 242	78Nm
Axle flared tube		300Nm
Cardan shaft flange on gear output shaft	mount with Loctite 242	300-350 Nm
Rear axle center bolt	M14x40	123Nm
Hydr. motor 140 on gear	M16x50 (cylinder screw 10.9)	200Nm
Hydr. motor 80 on gear	M12x45 (cylinder screw 8.8)	79Nm
Cardan shaft:		
Flange bolts	M12x35 8.8	
need to be replaced by Flange bolts:	M12x1,25x35 10.9	110Nm
TL310	M12x1,25x40 10.9	110Nm
Wheels:		
Wheel nuts	M22x1.5	610 Nm

Articulation:

Covers of swing bearings	M12x40 10.9 (cylinder screw)	120 Nm
Screws of steering cylinder pins	M12x30 (with Loctite 242)	80 Nm

Hydraulic cylinders:	**Piston nut :**	**Guide bushing:**
Steering cylinder	M30x2 1050Nm + Loctite 242	390-450Nm
Lift cylinder	M48x3 2050Nm + Loctite 242	M12x40 12.9 (12x) 155Nm
Bucket cylinder	M60x2 1800Nm + Loctite 242	M12x50 10.9 (18x) 120Nm

Hyraulic cylinder nuts/wrench size/torque table				
Thread size:	Part Number nut:	Wrench size:	Torque:	Add loctite 242:
M18x2	1 212 251 817	27 mm	200 Nm	yes
M22x2	1 212 251 819	32 mm	410 Nm	yes
M24x2	1 212 251 821	36 mm	450 Nm	yes
M27x2	1 212 251 824	41 mm	810 Nm	yes
M30x2	1 212 251 826	46 mm	1050 Nm	yes
M36x3	1 212 251 832	55 mm	1550 Nm	yes
M39x3	1 212 251 834	60 mm	1700 Nm	yes
M42x3	1 212 251 836	65 mm	1750 Nm	yes
M48x3	1 212 251 840	75 mm	1800 Nm	yes

Tightening torques TW70

Note: When using Loctite thread lock, make sure that the threads are clean and free of grease and oil.

Pump attachment (Yanmar engine):	**Bolt/screw type:**	**Torque:**
Secure all screws/bolts using Loctite 242!		
Clutch on Flywheel	M14x45 8.8 (3x)	170 Nm
Pump flange on clutch housing	M10x40/45 8.8 (12x)	45 Nm
Travel pump on pump flange	M16x40 (cyl. screw)8.8 (2x)	170 Nm
Working pump flange on travel pump	M12x25 (cyl. screw)8.8 (2x)	80 Nm
Working pump on working pump flange	M16x60 m. hex. nut (2x)	

Cooler:		
Cooler support on engine TW70 (Yanmar)	M10x35 8.8 (8x)	46 Nm
Fan on water pump TW70 (Yanmar)	M8x70 8.8 (4x)	23 Nm

Slewing gear:		
Slew ring on undercarriage	M16x70 10.9 (24x)	325 Nm
Slew ring on uppercarriage	M16x70 10.9 (24x)	325 Nm
Swing gear on uppercarriage	M16x35/40 10.9 (8x)	325 Nm
Caution — The contact faces of the screw heads must be of bright metal!		
Swing motor on swing gear	cylinder screws	130 Nm
Rotary transfer on uppercarriage	M12x40 12.9 (6x)	165 Nm
Torque support on rotary transfer	M16x50 10.9 (2x)	325 Nm

Counter weight:		
Attachment of counter weight TW70	M20x70 8.8 (1x top)	300 Nm
	M20x180 8.8 (2x bottom)	300 Nm
	M16x50 8.8 (1x right)	200 Nm

Wheel nuts:		
TW70	M22x1,5	610 Nm

Front axle TW70:		
Axle on chassis	M20x120 10.9 (4x)	490 Nm
Internal gear of planetary gear on axle	mount with Loctite 242	90-100 Nm
Drive flange cardan shaft on pinion shaft	mount with Loctite 270	80-120 Nm
Plate for plunger cylinder on axle	M12x60 8.8 (3x)	80 Nm

Rear axle TW70:		
Axle on chassis	M20x180 8.8 (8x)	400 Nm
Internal gear of planetary gear on axle stub	mount with Loctite 242	90-100 Nm
Drive flange cardan shaft on output shaft	mount with Loctite 270	80-120 Nm
Travel motor	M12x45 8.8 (4x)	80 Nm

Cardan shaft:	**Bolt/screw type:**	**Tightening torque:**
Flange screws, rear:	M8x20 10.9 (8x)	35 Nm
Flange screws, front:	M10x30 10.9 (8x)	69 Nm

Hydraulic cylinders on articulated boom:

Hydraulic cylinders:	**Piston nut :**	**Guide bushing:**
Dozer blade cylinders	M30x2 1050Nm + Loctite 270	M105x2 520-600Nm
	Pipe safety valve in cylinder	25Nm
Articulation cylinder	M36x3 1550Nm + Loctite 270	M12x40 12.9 (10x) 155Nm
Boom cylinder	M36x3 1550Nm + Loctite 270	M12x40 12.9 (10x) 155Nm
Intermediate boom cyl.	M30x2 1050Nm + Loctite 270	M10x30 10.9 (10x) 55Nm
Dipper cylinder	M36x3 1550Nm + Loctite 270	M12x40 12.9 (10x) 155Nm
Bucket cylinder	M30x2 1050Nm + Loctite 270	M10x30 10.9 (10x) 55Nm

Tightening torques TW85, 110

Note: When using Loctite thread lock, make sure that the threads are clean and free of grease and oil.

Pump attachment TW85 20km/h:	**Bolt/screw type:**		**Torque:**
Secure all screws/bolts using Loctite 242!			
Clutch on Flywheel	M10x35 8.8	(8x)	49 Nm
Clutch hub on pump shaft	clamp bolt		86 Nm
Pump flange on clutch housing	M10x25	(10x)	45 Nm
Travel pump on pump flange	M16x50 (cyl. screw) 10.9	(2x)	290 Nm
Working pump on travel pump	M16x50	(2x)	200 Nm

Pump attachment TW85 36km/h:			
Secure all screws/bolts using Loctite 242!			
Clutch on Flywheel	M10x20 8.8	(8x)	45 Nm
Pump flange on clutch housing	M10x25	(10x)	45 Nm
Travel pump on pump flange	M16x50 (cyl. screw) 8.8	(2x)	200 Nm
Working pump on travel pump	M16x50	(2x)	200 Nm

Pump attachment TW110:			
Secure all screws/bolts using Loctite 242!			
Flywheel clutch	M10x35 8.8	(8x)	49 Nm
Clutch hub on pump shaft	clamp screw		70 Nm
Pump flange on clutch housing	M10x25/30	(10x)	45 Nm
Travel pump on pump flange	M20x1.5x45 10.9	(4x)	400 Nm
Working pump on travel pump	M20x1.5x45 10.9	(4x)	400 Nm

Gear pump on Deutz engine:			
TW 85 (dual pump) M10x35	M10x185 10.9	(2x)	70 Nm
TW 110 (triple pump)	M10x265 10.9	(2x)	70 Nm

Cooler:			
Cooler support on engine TW85/110	M16x60 10.9	(4x)	290 Nm
Fan on water pump TW85/100	M8 8.8	(4x)	30 Nm

TW85 - Slewing gear:			
Slew ring on chassis	M16x80 10.9	(30x)	325 Nm
Slew ring on superstructure	M16x80 10.9	(30x)	325 Nm
Swing gear on superstructure	M16x120 8.8 Cyl bolt	(12x)	195 Nm

Caution — The contact faces of the screw heads must be of bright metal!

Swing motor on swing gear	M10x30 10.9	(4x) Cyl bolt	72 Nm
Rotary transfer on uppercarriage	M12x40 12.9	(6x)	165 Nm
Torque support on rotary transfer	M16x50 10.9	(2x)	325 Nm

TW110 - Slewing gear:	**Bolt/screw type:**	**Torque:**
Slew ring on chassis	M16x80 10.9 (24x)	325 Nm
Slew ring on superstructure	M16x80 10.9 (24x)	325 Nm
Swing gear on superstructure	M16x45 (12x) Cyl bolt	195 Nm
Caution — The contact faces of the screw heads must be of bright metal!		
Swing motor on swing gear	M10x30 10.9 (4x) Cyl bolt	72 Nm
Rotary joint on superstructure	M12x40 12.9 (6x)	165 Nm
Torque support on rotary joint	M16x50 10.9 (2x)	325 Nm
Rear weight:		
Attachment of rear weight TW85	M20x60 8.8 (1x top)	300 Nm
	M20x180 8.8 (2x bottom)	300 Nm
	M20x50 8.8 (1x right)	300 Nm
Attachment of rear weight TW110	M20x120 8.8 (3x top/bottom)	385 Nm
(from TW01100100 to TW01100559)	M20x50 8.8 (1x right)	300 Nm
Wheel nuts:		
TW85, 110	M22x1.5	610 Nm
Front axle TW85/110:		
Axle on chassis	M16x110 8.8 (4x)	200 Nm
Internal gear of planetary gear	mount with Loctite 242	1st step 120 Nm
on axle stub		2nd step 280 Nm
Drive flange cardan shaft	mount with Loctite 242	280-310 Nm
on pinion shaft		
Cardan shaft flange bolts:	M10x30 10.9 (8x)	69 Nm
Rear axle TW85/110:		
Axle on chassis	M20x210 8.8 (8x)	400 Nm
Intenal gear of planetary gear	mount with Loctite 242	1st step 120 Nm
on axle stub		2nd step 280 Nm
Drive flange cardan shaft	mount with Loctite 242	280-310 Nm
on pinion shaft		
Cardan shaft flange screws	M10x30 10.9 (8x)	69 Nm

TW85 Articulated boom:

Hydraulic cylinders:	**Piston nut: :**	**Guide bushing:**
Dozer blade cylinders	M30x2 1.050Nm + Loctite 270	M105x2 520-600Nm
	Hose rupture valve in cylinder	25Nm
Articulation cylinder	M36x3 1.550Nm + Loctite 270	M12x40 12.9 (10x) 145Nm
Boom cylinder	M42x3 1.850Nm + Loctite 270	M12x40 12.9 (12x) 155Nm
Intermediate boom cyl.	M36x3 1.550Nm + Loctite 270	M12x40 12.9 (12x) 155Nm
Stick cylinder	M42x3 1.850Nm + Loctite 270	M12x40 12.9 (12x) 155Nm
Bucket cylinder	M42x3 1.850Nm + Loctite 270	M10x30 10.9 (12x) 55Nm

TW110 Articulated boom:

Hydraulic cylinders:	**Piston nut:**	**Guide bushing:**
Dozer blade cylinders	M36x3 1.550Nm + Loctite 270	M115x2 630-725Nm
	Hose rupture valve in cylinder	25Nm
Articulation cylinders	M42x3 1.850Nm + Loctite 270	M12x40 12.9 (12x) 155Nm
Boom cylinder	M50x2 Nm + Loctite 270	M12x40 12.9 (16x) 155Nm
Intermediate boom cyl.	M36x3 1.550Nm + Loctite 270	M10x40 10.9 (12x) 80Nm
Stick cylinder	M56x2 1.600Nm + Loctite 270	M12x40 12.9 (12x) 155Nm
Bucket cylinder	M56x2 1.600Nm + Loctite 270	M12x40 12.9 (12x) 55Nm

Hyraulic cylinder nuts/wrench size/torque table				
Thread size:	Part Number nut:	Wrench size:	Torque:	Add loctite 242:
M18x2	1 212 251 817	27 mm	200 Nm	yes
M22x2	1 212 251 819	32 mm	410 Nm	yes
M24x2	1 212 251 821	36 mm	450 Nm	yes
M27x2	1 212 251 824	41 mm	810 Nm	yes
M30x2	1 212 251 826	46 mm	1050 Nm	yes
M36x3	1 212 251 832	55 mm	1550 Nm	yes
M39x3	1 212 251 834	60 mm	1700 Nm	yes
M42x3	1 212 251 836	65 mm	1750 Nm	yes
M48x3	1 212 251 840	75 mm	1800 Nm	yes


TEREX®

Subgroups list Technical Data

Machine type		Serial-Number	File Number
SKL 200	(SKL873SP)	**0100 >**	**2.13.05-06**
TL 65	(SKL824)	**0100 > 0328**	**2.22.01-02**
TL 65		**0329 > 0451**	**2.22.20-21**
TL 65		**0452 >**	**2.22.22-23**
TL 80	(SKL834)	**0100 > 0750**	**2.24.01-02**
TL 80		**0751 > 1180**	**2.24.03-04**
TL 80		**1181 >**	**2.24.20-21**
TL 80		**TL08020100 >**	**2.24.30-31**
TL 80 AS		**0100 > 0146**	**2.25.01-02**
TL 80 AS		**0147 >**	**2.25.20-21**
TL 100	(SKL844)	**0100 > 0452**	**2.26.01-02**
TL 100		**0453 > 0646**	**2.26.03-04**
TL 100		**0647 >**	**2.26.20-21**
TL 120	(SKL854)	**0100 > 0279**	**2.27.01-02**
TL 120		**0280 >**	**2.27.20-21**
TL 160	(SKL160)	**0100 > 0198**	**2.28.01-02**
TL 160		**0199 >**	**2.28.20-21**
TL 210		**0100 > 0138**	**2.29.01-02**
TL 210		**0139 >**	**2.29.20-21**
TL 260	(SKL260)	**0100 > 0134**	**2.30.01-02**
TL 260		**0135 > 0185**	**2.30.03-04**
TL 260		**0186 >**	**2.30.20-21**
TL 310		**0100 >**	**2.31.01-02**
TL 70	(SKS634)	**0100 > 0205**	**2.37.01-02**
TL 70		**0206 > 0249**	**2.37.03-04**
TL 70		**0250 > 0362**	**2.37.20-21**
TL 70		**0363 >**	**2.37.22-23**

Subgroups list Technical Data

Machine type		Serial-Number	File Number
TW 70	(HML23)	**0100 > 0231**	**2.49.50-51**
TW 70		**0232 >**	**2.49.60-61**
TW 85	(HML32)	**0100 > 0447**	**2.51.03-04**
TW 85		**0448 >**	**2.51.20-21**
TW 110	(HML42)	**0100 > 0339**	**2.53.02-03**
TW 110		**0340 > 0559**	**2.53.20-21**
TC 60	(HR20)	**0100 >**	**2.60.01-02**
TC 75	(HR32)	**0100 > 1039**	**2.65.11**
TC 75		**1040 >**	**2.65.20**
TC 125	(HR42)	**0100 > 0312**	**2.67.02**
TC 125		**0313 >**	**2.67.20**
TC 29	(HR14)	**0100 > 0808**	**2.76.03**
TC 29		**0809 >**	**2.76.04**
TC 35	(HR16)	**0100 > 0556**	**2.78.03**
TC 35		**0557 >**	**2.78.04**
TC 48	(HR18)	**0100 > 0578**	**2.80.02**
TC 48		**0579 >**	**2.80.03**
TC 15		**0100 > 0162**	**2.90.02**
TC 15		**0163 > 0181**	**2.90.03**
TC 15		**0182 >**	**2.90.20**
TC 16		**0100 > 0732**	**2.91.02**
TC 16		**0733 > 0884**	**2.91.03**
TC 16		**0885 >**	**2.91.20**
TC 20		**0100 > 0492**	**2.92.01**
TC 20		**0493 > 0808**	**2.92.02**
TC 20		**0809 >**	**2.92.20**
TC 25		**0100 >**	**2.93.20**
TC 37	(HR3.7)	**0100 > 0428**	**2.97.01**
TC 37		**0429 >**	**2.97.02**
TC 50	(HR5.0)	**0100 > 0352**	**2.99.01**
TC 50		**0353 >**	**2.99.20**

DIESEL ENGINE

Manufacturer:		Perkins
Type:		1106C-E60TA
Performance acc. to DIN 70020:	kW/PS	106 / 144 at 2,200 min^{-1}
Construction:		6 cylinders in line
Cooling:		water
Injection:		direct injection
Spec. fuel consumption:	g/kWh	220
Capacity:	cm^3	6,000
High idle:	min^{-1}	2,350 $^{+50}$
Low idle:	min^{-1}	750 $^{+50}$
Tappet clearance - inlet cold:	mm	0.20
Tappet clearance - outlet cold:	mm	0.45
Further data:		see engine instruction book

ELECTRIC SYSTEM

Voltage:	V	24
Battery:	V/Ah/A	2 x 12 / 105 / 760
Alternator:	V/A	24 / 80
Starter:	V/kW/PS	24 / 4.5 / 6.1
Starting aid:		glow system
Lighting:		acc. to German motor vehicle construction and use regulation and Euronorm

TRANSMISSION

Travel pump:	type	A 4 VG 125 DA with pressure cut-off
Displacement:	max. cm^3/rev.	125
Travel motor:	type	A 6 VM 160 DA 6
Displacement:	max. cm^3/rev.	160

TRAVEL RANGE

4 pre-selectable travel ranges, electro-hydraulically operated:

SKL 200: 20 km/h - version		
Gearbox position 1, tortoise / rabbit:	km/h	0 to 7 / 0 to 15
Gearbox position 2, tortoise / rabbit:	km/h	0 to 10 / 0 to 20
SKL 200: 40 km/h - version		
Gearbox position 1, tortoise / rabbit:	km/h	0 to 7 / 0 to 16
Gearbox position 2, tortoise / rabbit:	km/h	0 to 16 / 0 to 40

Cardan shaft rev. at **20 km/h - version**

				adjustment at nominal speed tortoise / rabbit
tyres				1./2. gear / 1./2. gear
standard:	20.5-25 12PR SGLD/L-2	Good Year:	min^{-1}	450 / 660 800 / 1,170
option:	20.5 R25 XHA TL	Michelin:	min^{-1}	450 / 660 800 / 1,170
	20.5-25 12PR E91TL	Dunlop:	min^{-1}	450 / 660 820 / 1,200
	555/70 R25 XHF	Michelin:	min^{-1}	450 / 660 840 / 1,230
	20.5 R25 EM RL-2	Good Year:	min^{-1}	450 / 660 800 / 1,170

Cardan shaft rev. at **40 km/h - version**

				adjustment at nominal speed tortoise / rabbit
tyres				1./2. gear / 1./2. gear
standard:	20.5-25 12PR SGLD/L-2	Good Year:	min^{-1}	450 / 1,035 1,015 / 2,330
option:	20.5 R25 XHA TL	Michelin:	min^{-1}	450 / 1,035 1,015 / 2,330
	20.5-25 12PR E91TL	Dunlop:	min^{-1}	450 / 1,035 1,040 / 2,380
	555/70 R25 XHF	Michelin:	min^{-1}	450 / 1,035 1,065 / 2,450
	20.5 R25 EM RL-2	Good Year:	min^{-1}	450 / 1,035 1,015 / 2,330

PRESSURE AND SETTING VALUES — travel

Suction pressure:	max. bar	- 0.25
Charge pressure (high idle):	bar	32 $^{\pm 1}$
High pressure (safety valves):	bar	480
Pressure cut-off:	bar	440 $^{\pm 10}$
Case pressure:	max. bar	2.5
Regulation start (DA-motor):	bar	220 (motor can be stalled up to 2,100 $_{-50}$ min^{-1})
Start-up speed:	min^{-1}	1,150 $^{\pm 50}$
Engine stalling (tortoise):	min^{-1}	2,000 $^{-100}$ at full speed and 220 bar HP
Brake inching beginning / end:	bar	5 / 13

STEERING

Steering unit:	type	Rexroth LAGU 320/160-12/LD 240-175
Servo selector valve:	type	Rexroth 7730
Steering pump:	make	Brueninghaus (see working hydraulics)
Steering pressure:	bar	205 $^{+10}/_{-5}$ (LS eff. 175 bar)
Supplementary steering (shift pressure)	bar	20 $^{\pm 2}$

WORKING HYDRAULICS

Working and steering pump:	make	Brueninghaus/Rexroth
	type	A10 VO 71 DFR 1
Displacement:	cm³/rev.	71
	ltr./min	156
Stand-by pressure (flow controller):	bar	32 $^{+2}$
Servo-controlled valve:	type	PRSV C01
Control valve:	type	Rexroth 3 M6-15

PRESSURE AND SETTING VALUES — working

LS pressure relief valve:	bar	250
Line relief pressures:		
- lifting frame lift:	bar	280 $^{+10}$
- lifting frame lower:	bar	anti-cavitation
- shovel dump in:	bar	280 $^{+10}$
- shovel dump out:	bar	280 $^{+10}$
- additional control circuit:	bar	230 $^{+10}$ / 230 $^{+10}$

WORKING CYCLES

Lifting frame lift:	s	6.3
Lifting frame lower:	s	4.3
Shovel dump in:	s	1.3
Shovel dump out:	s	1.4

AXLES

Front axle with self-locking diff., 20 km/h - version:	make/type	DANA 176 / 348
Rear axle with self-locking diff., 20 km/h - version:	make/type	DANA 360 / 176 / 70
Lock value:	max. 45%	
Front axle with self-locking diff., 40 km/h - version:	make/type	DANA 176 / 348
Rear axle with self-locking diff., 40 km/h - version:	make/type	DANA 360 / 176 / 69

BRAKE SYSTEM

Service brake (four-wheel-brake):		hydraulic 2-circuit brake, oil-immersed disks of both axles
Parking brake (hydraulic hand brake valve):		spring-loaded brake acting on the disks of both axles
Additional brake:		hydrostatic by closed circuit of the transmission
Brake pump (accessory drive):	make	Cassappa PLP 20.11.2
Displacement:	cm^3/rev.	11
	ltr./min.	24
Brake pressure (service brake):	max. bar	60 $^{+6}$
Accumulator charge valve:	make	Rexroth type LT 13
Cut-in / cut-off pressure:	bar	120 - 150
Sequence valve (pressure sequence valve):	bar	Δp 13 (e.g. 60 bar brake pressure means 60 bar at the inching valve and 47 bar at the brake)
Opening pressure (parking brake):	bar	15
Setting value, parking brake:	bar	25

LUBRICANTS

Engine:	see engine instruction book
Hydraulic oil:	see Schaeff hydraulic oil recommendation table
Transmission oil:	MIL-L 2105 B or API-GL 5, SAE 85 W 90 LS or SAE 90 LS
Multi-purpose grease:	acc. to DIN 51825. Dripping point over 170° C. With lithium.
Brake medium:	hydraulic oil

MAINTENANCE PARTS

see instruction book

CAPACITIES

	ltr.	
Engine oil - change:	approx. 15.0	engine oil (+ 2 x 0.5 l filter)
Hydraulic oil (tank and system):	approx. 170.0	hydraulic oil
Hydraulic oil (change):	approx. 130.0	hydraulic oil
Fuel tank:	approx. 210.0	diesel
Front axle - central housing:	approx. 11.5	transmission oil
Front axle - wheel hub:	approx. 2.35	transmission oil, each
Rear axle - central housing:	approx. 10.5	transmission oil
Rear axle - reduction gearbox:	approx. 3.4	transmission oil
Rear axle - wheel hub:	approx. 2.35	transmission oil, each
Service brake:	connected to the hydraulic system	
Cooling agent:	approx. 46.0	water with anti-corrosive and anti-freeze agent


TEREX

DIESEL ENGINE

Manufacturer:		Deutz
Type:		F4M 2011
Performance according to (ECE-R24/ISO1585/ISO9249):	kW	37 at 2,300 min^{-1}
Construction:		4 cylinders in line
Cooling:		external oil cooling
Injection:		direct injection
Capacity:	cm^3	3,100
High idle:	min^{-1}	2,450 $^{+50}$
Low idle:	min^{-1}	850 $^{+50}$
Spec. fuel consumption under full load:	g/kWh	216
Tappet clearance - inlet cold:	mm	0.30
Tappet clearance - outlet cold:	mm	0.50
Torque of cylinder head studs (only in case of repair):	Nm	30 / 80 / 160 Tightening angle 90°
Further data:		see engine instruction book or chapter 3

ELECTRICAL SYSTEM

Voltage:	V	12
Battery:	V/Ah/A	12 / 80 / 720 (EN)
Generator:	V/A	14 / 95
Starter:	V/kW/PS	12 / 2.3 / 3.1
Cold start aid:		heater plug
Lighting:		acc. to German motor vehicle construction and use regulation (“StVZO”) and Euronorm. H4 halogen headlamp. Two working lights at the front.

TRANSMISSION

Travel pump:	type	A 4 VG 40 DA with pressure cut-off
Displacement:	max. cm^3/rev.	40
Travel motor 20/36 km/h version:	type	A 6 VM 55 DA 2
Displacement 20/36 km/h version:	max. cm^3/rev.	55

TRAVEL RANGE

Two/ four pre-selectable travel ranges, electro-hydraulically controlled:

TL 65:	**20 km/h - version:**		
	tortoise / rabbit	km/h	0 to 7.0 / 0 to 20
TL 65 S:	**36 km/h - version:**		
Gearbox position 1, tortoise / rabbit:		km/h	0 to 6.5 / 0 to 18
Gearbox position 2, tortoise / rabbit:		km/h	0 to 13 / 0 to 36

Cardan shaft rev. at **20 km/h - version**			adjustment at nominal speed tortoise / rabbit	
and standard tyres	365/70 R18:	min^{-1}	650 / 1,985	
	12,5-18:	min^{-1}	650 / 1,985	
	335/80 R18:	min^{-1}	650 / 1,940	
Cardan shaft rev. at **36 km/h - version**			adjustment at nominal speed tortoise / rabbit	
			1./2. gear / 1./2. gear	
and standard tyres	365/70 R18:	min^{-1}	630 / 1,290	1,750 / 3,565
	12,5-18:	min^{-1}	630 / 1,290	1,750 / 3,565
	335/80 R18:	min^{-1}	630 / 1,290	1,710 / 3.490