Workshop Service Manual

FENDT 500 Vario S4

FENDT 512 Vario S4
435 .. 1001-
FENDT 513 Vario S4
436 .. 1001-
FENDT 514 Vario S4
437 .. 1001-
FENDT 516 Vario S4
438 .. 1001-

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FENDT is a worldwide brand of AGCO

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English

Subject to changes and additions

IMPORTANT:
This document is valid from the chassis number noted. The last valid chassis number could not be determined at the time of creation. Use AGCONET or contact FENDT technical service to make sure whether a current wiring diagram set is available with an updated chassis number range.

Due to further developments to the vehicle, the content of this document is subject to change.

The relevant accident prevention regulations must be observed, as must as any generally acknowledged safety, industrial medicine and traffic regulations. The manufacturer does not accept liability for damage resulting from unauthorized modifications to the machine.

TABLE OF CONTENT

1. 0000 - tractor

1.1 General

1.1.1 General advice

This technical document sets out all available versions of the FENDT 500 Vario S4 series.

- **Fendt 500 Vario S4 Power**
- **Fendt 500 Vario S4 PowerPlus**
- **Fendt 500 Vario S4 Profi - ProfiPlus**

This means that not all parts described are installed in the "Power" version.

For example, this is the case for the next section.

- Chapter 0000 — component position
- Chapter 5500 — air conditioning system
- Chapter 9000 — electrical system, section "measuring and testing"

NOTE:
The "measuring and testing" section may contain two sets of duplicate test documents, however these documents are differentiated between by the addition of "Power version", "PowerPlus version" or "Profi–ProfiPlus version" in the title section.
It is clear from the respective circuit diagrams which components are installed.

1.1.2 Notes on documentation

To ensure that the information is structured in a user-friendly manner, the service documentation is divided into the operator's manual and the workshop manual.

The operator's manual includes a general description as well as instructions for all necessary maintenance work.

Knowledge of the owner's manual is essential to understand the workshop manual. This is particularly important for safety instructions.

The workshop manual describes repairs to assemblies and components, which will require more effort and suitably qualified specialists to carry out.

Note

This workshop manual provides notes for trained technicians to maintain our tractors.

Read and observe the information in this documentation. This will help you prevent accidents and safeguard the manufacturer's warranty.

The respective accident prevention rules as well as other generally recognized safety and occupational health rules must be observed.

The tractor is built solely for the purpose defined by the implement manufacturer (intended use). Any other type of use is considered unauthorized. The manufacturer bears no liability for any damage resulting from improper use. The user bears this risk alone. Intended use includes maintaining operating, service and maintenance conditions as specified by the manufacturer.

Operation, maintenance and repair of the tractor may only be carried out by people who are familiar with this equipment and aware of the associated dangers. Ensure that this documentation is available to and understood by everyone involved in operation, maintenance and repair. Not observing this documentation can lead to faults, damage and personal injury, for which the manufacturer assumes no liability. The prerequisite for the tractor being correctly serviced and maintained is the perfect condition and availability of all necessary equipment, standard tools and general workshop equipment as well as special tools. The use of special tools is restricted to where absolutely necessary, and are displayed both where they need to be used and in a summary at the end of the manual.

The machine must be maintained according to its proper use. **Always** replace parts with genuine AGCO spare parts! When ordering parts, please provide the chassis number as per the most up-to-date spare parts documentation.

Only parts approved by the manufacturer for that specific purpose may be used for any alterations. The manufacturer will not accept liability for any damage resulting from unauthorized modifications to the tractor. Non-compliance invalidates the warranty!

Workshops should also refer to documentation on maintenance work and technical data.

Once maintenance is complete, take a test drive to ensure the vehicle's correct operation and road safety.

We reserve the right to make design changes in light of technical developments.

Notes on repairs

The assembly/disassembly instructions shown correspond to the design status at the time the workshop manual was drawn up.

Further technical development of the product and additions related to different versions may require alternative working processes that do not pose too many difficulties to trained and qualified specialists.

These assembly/disassembly instructions shall be invalidated upon issue of the next version of this document.

1.1.3 Safety briefing and measures

Important notes on work safety

The statutory accident prevention regulations (available from professional associations or specialist shops) must be observed. These depend on the operating site, operating mode and fuels and lubricants used. Special protective measures dependent on the respective procedures are specified in the corresponding repair guidelines and highlighted.

This handbook uses the following safety tips

DANGER:
This symbol together with the word DANGER means there is an immediate risk of danger that must be prevented to avoid the risk of DEATH OR SERIOUS INJURY.

WARNING:
This symbol together with the word WARNING means there is a potential danger that must be prevented to avoid the risk of DEATH OR SERIOUS INJURY.

CAUTION:
This symbol together with the word CAUTION means there is a potential danger that must be prevented to avoid the risk of MINOR INJURY.

Please observe the following when carrying out maintenance or service work to the tractor:

Only the documentation associated with the vehicle (workshop manual and operator's manual) must be used to complete any pending work.

1. General

- Only briefed personnel may operate the tractor or carry out maintenance work.
- Only use qualified specialists to carry out repairs or service work.
- Nobody may be in the cab while work is being carried out under the jacked-up tractor.
- Relieve pressure from implement lines, e.g. to the front loader.
- All people should keep clear of a lifted, unsecured load (e.g. tilted cab etc.).
- Never open or remove any safety devices while the engine is running.

- Pressurized fluids (fuel or hydraulic oil) escaping under high pressure can penetrate the skin and cause severe injuries. If this should occur, seek medical advice immediately to avoid the risk of serious infection.
- Keep at a safe distance from hot areas.
- Pressure accumulator and connected pipes are highly pressurized. Only remove and repair in accordance with instructions provided in the workshop manual.
- To avoid eye injury, do not look directly at the surface of the activated radar sensor.
- Dispose of oil, fuel and filters properly!
- Specialist knowledge and special fitting tools are required to fit tires.
- Run the tractor for a short time, then retighten all wheel nuts and bolts and check them regularly.

  For correct torque values refer to TECHNICAL DATA.
- Before working on the electrical system, always remove the earth strap from the battery. Observe the following when carrying out electric welding. Before carrying out welding work on tractor or mounted implements, ensure that both battery terminals are disconnected. Attach the welding appliance's earth terminal as close to the welding spot as possible.
- Caution is required when dealing with brake fluid and battery acid as these are toxic and corrosive!
- Only use genuine FENDT spare parts.

2. Working on the front axle suspension

DANGER:

- **The front axle suspension pressure lines between the central control block (ZSB) and the suspension cylinder, and**
- **the encased ASP and ZSP pressure accumulators,**

  are under 200 bar pressure, even when the engine is switched off and the suspension is lowered (= locked).

  Safety measures:

  Prior to each repair and after releasing or opening in this area, the pressure must be released manually.

NOTE: *The "Lock suspension/lower suspension" command has no effect!*

To release pressure:

- Screw in the knurled-head screw on the **Y013** lower suspension solenoid valve ;

  the chassis may be lowered
- Screw in the knurled-head screw on the **Y014** raise suspension solenoid valve ;

  the rebound accumulator will be relieved

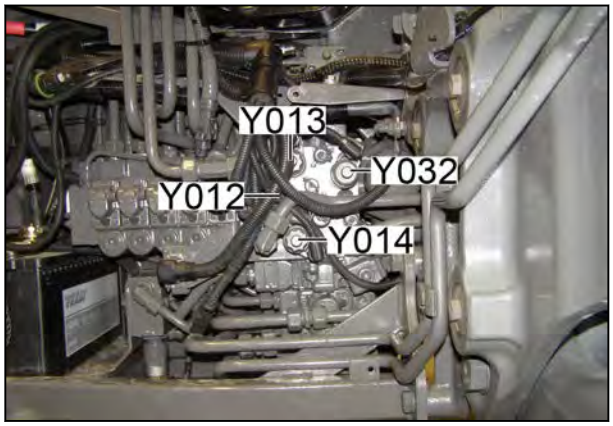


Fig. 1

Check:

As the oil temperature rises, the emptying accumulator will make a flowing sound

(barely audible in winter).

3. Working on the brake system

DANGER: The brake system hydraulic lines remain under pressure even when the engine has been switched off!

Hydraulic oil escapes under high pressure.

Before each repair to the brake system or when removing the cab, the pressure must be relieved manually.

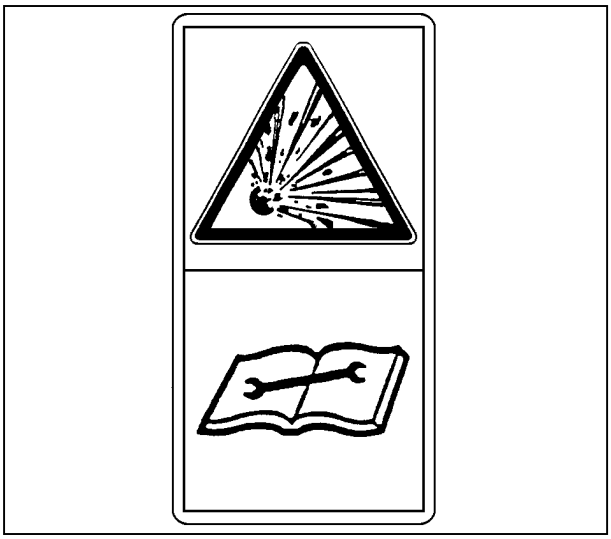


Fig. 2

To release pressure:

1. Engine must be off
2. Make sure the tractor is secured to prevent it rolling
3. Actuate the foot brake at least 5x

General notes:

- Always check the brakes before driving.
- Adjustments and repairs to the brake system must be carried out in specialist workshops or by approved brake repair technicians.
- It must not be possible to brake individual wheels when driving (lock pedals)!

4. Working on the engine

- After switching the engine off, wait 30 seconds before carrying out any work on the fuel system.
- Only start the engine once all safety guards have been attached and nobody is standing in the danger area.
- Never let the engine run in enclosed spaces with no exhaust gas suction system.
- Cleaning, maintenance and repair work may only be carried out once the engine is switched off and secured to prevent it starting.
- Injection pipes and high-pressures lines must not be deformed.
- Any damaged injection pipe or high-pressure line must be replaced.
- Do not loosen any injection pipes for high-pressure fuel lines while the engine is running.
- Before carrying out checks to the running engine, always perform a visual check of all high-pressure components. Suitable protective clothing (e.g. protective goggles) should be worn while doing this. Leaks indicate potential sources of danger for workshop personnel.
- In the event of leaks to the high-pressure fuel system, always remain out of range of any possible fuel spray to avoid serious injury.
- Even when no leaks to the high-pressure fuel system can be detected, workshop personnel should avoid the immediate danger area and wear suitable protective clothing (such as protective goggles) when carrying out checks to the running engine and during the first test run.
- Smoking is forbidden while carrying out work to the fuel system.
- Do not work in the proximity of sparks or naked flames.
- Never disconnect an injector while the engine is running.

5. Working on the PTO

- Always switch off the engine before fitting or removing the drive shaft. PTO in "0" position!
- When working on the PTO, allow no-one in the vicinity of the rotating PTO or drive shaft.
- Make sure drive shaft and PTO are equipped with shield pipes and protective funnels.
- After deactivating the PTO, it is possible that parts on the mounted implement may continue to run. In this case, do not get too close to the implement. Work may only be carried out to the implement when nothing is moving!
- When the drive shaft is removed, cover the PTO shaft with its protective cap.

- Nobody should be in the cab when installing and removing the drive shaft.

  Operation of controls for the tractor and mounted implements by people in the cab, especially children, may result in severe or fatal injury.

6. Working on the front loader

- Before undertaking maintenance work, lower the front loader to the ground, switch off the engine and remove the ignition key.
- In the event of a collapsed pipe rupture feature, support the load before starting repair work, and slowly retract the cylinder.
- Check hydraulic hoses and pipes for signs of damage and aging regularly and replace with genuine spare parts in good time.
- Following installation and repairs, operate the tractor for a short time, then retighten all nuts and bolts and check them regularly.
- Retighten eccentric bolt for front loader attachment, if necessary.

Disposal

The work described in the operator's manual and workshop manual includes replacing parts, fuel and lubricants. These renewed parts/fuel/lubricants must be stored, transported and disposed of in accordance with regulations. The repairing workshop bears responsibility for this. The disposal encompasses the recycling and final disposal of parts, fuel and lubricants with recycling having the higher priority. Details about disposal and monitoring are specified in regional, national and international laws and directives, the observation of which is the sole responsibility of the repairing workshops.

1.1.4 Biodegradable hydraulic oil

Oil quality

Use rapeseed-oil and synthetic-based HEES biodegradable hydraulic oil with a viscosity in accordance with ISO VG 32-ISO VG 46.

NOTE:
Polyglycol-based synthetic oils cannot be used.

Instructions for use

Biodegradable hydraulic oil is suitable for winter temperatures down to approx. -15°C.

Vegetable-based hydraulic oil may thicken in outside temperatures below approx. -15°C or if the tractor is not used for long periods of time. After a cold start, allow a short warm-up time at medium engine speed to ensure safe operation of the hydraulic steering and linkage. In extremely low temperatures, it may be necessary to warm up the entire tractor.

Avoid mixing with mineral oils, e.g. with any oil remaining in the system or by connecting and operating an external implement. This may affect the positive environmental properties of the fluid, and will make it more difficult to dispose of (it will then have to be considered as hazardous waste).

Current legislation and the instructions of the oil manufacturer must be observed when disposing of oil.

A mixture containing more than 20% may result in alterations in viscosity and may lead to problems with the hydraulic valves.

Maintenance intervals

The oil and oil filter need to be changed every 1000 running hours or every year, whichever occurs first.

When switching to biodegradable hydraulic oil, change the hydraulic oil filter after approx. 50–100 running hours. Since biodegradable hydraulic oil acts as a solvent, any oil residue may block the filter.

Special features of biodegradable hydraulic oil

Biodegradable hydraulic oil is more easily biodegradable and has less of an effect on the ground and groundwater in the event of accidental spills.

IMPORTANT:
In spite of the high environmental compatibility of biodegradable hydraulic oil, accidental spills must always be reported.

1.1.5 Tightening torques for bolts in Nm (kpm)

Choose the correct friction coefficient

To ensure that the tightening torque and preload value can be accurately determined, it is essential to know the **friction coefficient (μ_{total})**. Varying surface properties and lubrication conditions give rise to a wide range of friction coefficients. If not otherwise specified, tightening torques can be calculated based on their friction coefficient using the table below.

NOTE:
Locking screws with retaining ridges on the screw head contact surface have a greater friction coefficient.

Tightening torques in relation to the friction coefficient

Metric thread with a friction coefficient of μ_{total} = 0.14								
	6.9		8.8		10.9		12.9	
Size	Nm	(kpm)	Nm	(kpm)	Nm	(kpm)	Nm	(kpm)
M6	8.4	0.85	9.8	1	13.7	1.4	16.7	1.7
M8	20.6	2.1	24.5	2.5	34.3	3.5	40.2	4.1
M 10	40.2	4.1	48.1	4.9	67.7	6.9	81.4	8.3
M 12	70.6	7.2	84.4	8.6	117.7	12	142.2	14.5
M 14	112.8	11.5	132.4	13.5	186.4	19	225.6	23
M 16	176.6	18	206	21	289.4	29.5	348.2	35.5
M 18	240.3	24.5	284.5	29	392.4	40	475.8	48.5
M20	338.4	34.5	402.2	41	569	58	676.9	69
M 22	456.2	46.5	539.5	55	765.2	78	912.3	93
M24	588.6	60	696.5	71	981	100	1177.2	120
M27	873.1	89	1030	105	1471.5	150	1765.8	180
M30	1177.2	120	1422.4	145	1962	200	2354.4	240

Metric fine thread with a friction coefficient of μ_{total} = 0.14								
	6.9		8.8		10.9		12.9	
Size	Nm	(kpm)	Nm	(kpm)	Nm	(kpm)	Nm	(kpm)
M8x1	22.6	2.3	26.5	2.7	37.3	3.8	44.1	4.5
M10x1.25	42.2	4.4	51	5.2	71.6	7.3	86.3	8.8
M12x1.25	78.5	8	93.2	9.5	132.4	13.5	157	16
M12x1.5	74.5	7.6	88.3	9	122.6	12.5	147.1	15

Metric fine thread with a friction coefficient of μ_{total} = 0.14								
	6.9		8.8		10.9		12.9	
M14x1.5	122.6	12.5	147.1	15	206	21	245.2	25
M16x1.5	186.4	19	220.7	22.5	309	31.5	372.8	38
M18x1.5	296.8	27.5	318.8	32.5	451.3	46	539.5	55
M20x1.5	377.7	38.5	451.3	46	627.8	64	755.4	77
M22x1.5	510.1	52	598.4	61	843.7	86	1030	105
M24x2	637.6	65	765.2	78	1079.1	110	1275.3	130
M27x2	951.6	97	1128.1	115	1569.6	160	1912.9	195
M30x2	1324.4	135	1569.6	160	2207.2	225	2648.7	270

1.1.6 Assignment table FENDT T types to the EU Type Approval Number

The EU type approval number consists of the lower case letter "e" followed by the code letter or number of the member state granting the EU type approval. The FENDT T type designation classifies the relevant series and forms part of the 17-digit vehicle identification number (VIN).

Fig. 3 Exemplary illustration

Series	FENDT 200 Vario V/F/P	FENDT 200 Vario	FENDT 300 Vario
Type approval number	**e1*167/2013*00053**		**e1*167/2013*00054**
Chassis numbers	T232	T300	T347
	T233	T301	T348
	T234	T302	T349
	T235	T303	T350
	T236	T304	
	T239		
	T240		
	T241		
	T242		
	T243		
	T251		
	T252		
	T253		

Series	FENDT 500 Vario	FENDT 700 Vario	FENDT 800 Vario
Type approval number	**e1*167/2013*00042**	**e1*167/2013*00049**	**e1*167/2013*00047**
Chassis numbers	T435	T738	T839
	T436	T739	T840
	T437	T740	T841
	T438	T741	T842
		T742	
		T743	

Series	FENDT 900 Vario	FENDT 1000 Vario
Type approval number	**e1*167/2013*00056**	**e1*167/2013*00055**
Chassis numbers	T950	T527
	T951	T528
	T952	T529
	T953	T530
	T954	

1.1.7 Importance of and position of the safety decals

The position and importance of the safety decals on the vehicle are explained below:

Position: Left C-pillar, cab interior

743.810.090.050

WARNING:
Serious injury or death caused by inadequate compliance with the Operator's Manual
Inadequate compliance with the Operator's Manual can cause damage, injuries and in serious cases death.
Before operation, make sure that this Operator's Manual is available on the vehicle in legible form. The owner is responsible for providing adequate training to those personnel who are entrusted with the vehicle and for ensuring they are familiar with the instructions in the Operator's Manual and, where applicable, the service manual. The same applies to those persons who are both owner and operator.
Observe all safety notes and instructions, and execute all measures correctly and completely at all times.

Position: Left B-pillar, cab interior

743.810.090.100

WARNING:
Serious injury or death caused by being ejected from the cab
When driving, an improperly closed door can open. Vehicle occupants not strapped in or not properly strapped in can be ejected from the vehicle and run over. This can cause serious injury and even death.
Make sure that, during travel, all vehicle passengers are properly strapped in at all times.

Position: Left C-pillar, cab interior

743.810.090.060

WARNING:
Serious injury or death caused by being ejected from the cab
If the vehicle tips over, the door can open. Vehicle occupants not strapped in or not properly strapped in can be ejected from the vehicle. This can cause serious injury and even death.
Make sure that, during travel, all vehicle passengers are properly strapped in at all times.

Position: Left B-pillar, cab interior

743.810.090.130

WARNING:
Serious injury or even death caused by critical driving situations due to the operator's seat lateral suspension being activated
When the lateral suspension is activated, critical driving situations can occur during road travel if the vehicle becomes difficult to operate. This can cause serious injury and even death.
Deactivate the lateral suspension when travelling on public roads. When not on public roads, do not drive too fast when the lateral suspension is activated.

Position: Left-hand B-pillar, cab interior and left-hand rear of tractor, under the cab

743.810.090.090

WARNING:
Serious injury or death caused by running over persons when leaving the vehicle
The vehicle can start rolling due to non-activation of the parking brake before leaving the vehicle, in which persons in the area of the vehicle can be caught and run over.
Activate the parking brake before leaving the vehicle and remove the vehicle key.

Position: Left B-pillar, cab interior

743.810.090.150

DANGER:
Danger of inhaling hazardous substances. Refer to Operator's Manual for safety instructions and the correct settings for the ventilation system.

Position: Under engine cover, next to coolant expansion tank

743.500.410.080

DANGER:
Scalding caused by hot coolant vapor
After the vehicle has been operated, the cooling circuit contains pressurized, hot coolant. When the coolant reservoir or circuit is opened, the coolant escapes in the form of hot vapor and can cause scalding if allowed to come into direct contact with the skin.
Before opening the coolant reservoir or circuit, switch off the engine and allow sufficient time for the coolant to cool down.
The maintenance manual contains all important information.

Position: Right-hand side of tractor, at exhaust as well as left and right of radiator

743.500.410.060

DANGER:
Severe burns caused by contact with hot surfaces
Components heated up by engine operation or external influences, e.g. engine parts, the exhaust system, hydraulic system etc. can cause severe burns on contact.
Maintain an adequate distance from hot components. If work has to be performed on these components, allow them to cool down first. Wear safety gloves if necessary.

Position: Battery box, right side of vehicle

743.500.410.030

WARNING:
Burns caused by explosive flames and chemical burns caused by battery electrolite
Direct contact with escaping battery electrolite causes chemical burns to the eyes. Escaping battery electrolite can react with the ambient air to form an explosive mixture.
Avoid direct contact with battery electrolite and always wear gloves and goggles when working with an open battery. During such work, do not use naked flames and avoid spark formation.
The Operator's Manual contains all important information.

Position: Right and left at radiator

743.500.410.070

DANGER:
Danger of body parts being torn off! Switch the engine off and remove the ignition key before maintenance and repair work.

Position: Right and left at radiator

743.500.410.050

DANGER:
Danger of body parts being crushed or pulled into the machine! Switch the engine off and remove the ignition key before maintenance and repair work.

Position: On hydraulic pressure accumulator

X655.505.700.000

WARNING:
High-pressure injection-related injury caused by an escaping high-pressure jet
If screw connections are opened improperly or hydraulic lines are removed incorrectly, hydraulic fluid under high pressure will escape in a jet even if the engine is switched off. This can cause serious injuries, especially to the eyes. The high-pressure jet can also cause serious injury to the body and limbs and the hydraulic fluid can penetrate the skin and cause blood poisoning.
Make sure that the hydraulic circuit is opened only by appropriately trained maintenance personnel. Never open screw connections on the hydraulic system or remove hydraulic lines when the engine is running or when the engine is starting up. Release the pressure when the engine is switched off. Always wear gloves and goggles to open the hydraulic circuit.

Position: Left-hand side of engine, at the front above the front axle and left/right rear mudguard, at the rear

737.500.410.030

WARNING:
Serious injury caused by incorrect power lift actuation
When the rear power lift is actuated via the external pressure switch, any persons standing between the vehicle and the implement can be crushed as the implement is raised and positioned.
Make sure, when actuating the external pressure switch of the rear power lift, that nobody is standing between the vehicle and the implement.

Position: Cover of PTO stub

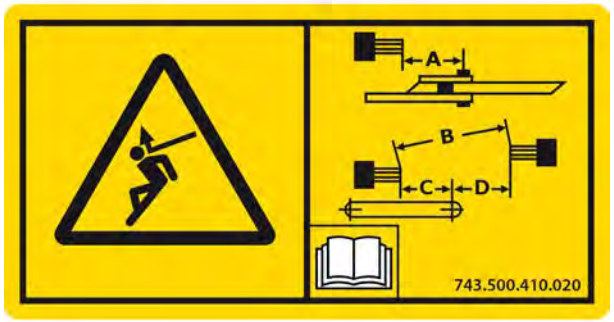
743.500.410.110

DANGER:
Danger of slipping and of serious injury. Do not use the PTO cover or rear linkage components as a step.

Position: Cover of PTO stub

743.500.410.020

DANGER:
Danger due to parts being flung around if transmission shafts or implements are installed improperly. Observe the safety instructions in the Operator's Manual.



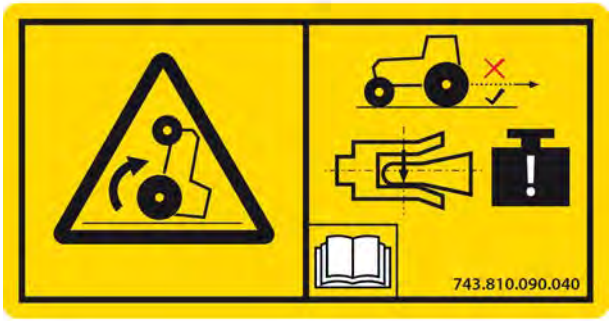
Position: Left and right at the front axle

743.500.410.040

DANGER:
Danger of body parts being crushed. Switch the engine off and remove the ignition key before maintenance and repair work.

Position: Left / right rear left mudguard, rear

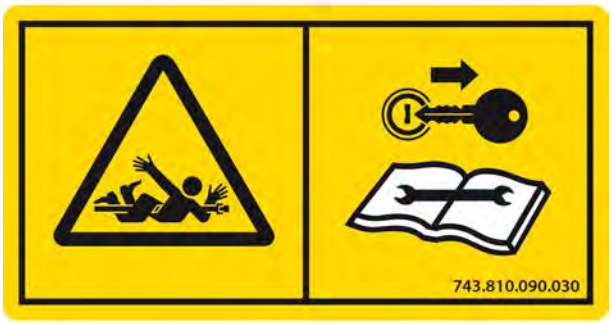
743.810.090.040



WARNING:
Serious injury or death caused by the vehicle tipping over
Exceeding the maximum permissible hitch load on the towing hitch can result in critical driving conditions through the front wheels being raised. In the worst case, the vehicle can tip over. This can cause serious injury and even death.
Always respect the maximum hitch load indicated on the sign plate of your vehicle.

Position: Left-hand side of engine, at the front above the front axle and left/right rear mudguard, at the rear

743.810.090.030



WARNING:
Serious injuries or death during incorrect work on the PTO.
When working on the PTO, a rotating PTO can cause crushing, shearing and impact injuries.
Before removing safety devices and performing other work on the PTO, remove the ignition key and make sure that the PTO cannot be reactivated until a safe state has been restored.
The maintenance manual contains all important information.

Position: Above the hydraulic couplers at rear and on right side of tractor, next to hydraulic couplers in the centre

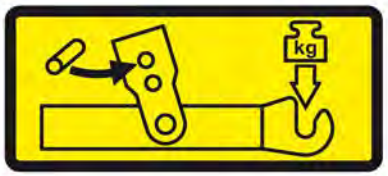
737,960,100,160

NOTE:
Do not use the hydraulic connectors simultaneously. Do not use the hydraulic valves for the front loader to operate the rear hydraulic connectors when a front loader is attached.

Position: Left/right bottom link lift rod, rear

835.870.030.060

CAUTION:
Damage to the bottom link lift rod due to incorrect bottom link floatation
If the lift rod bolt is incorrectly set to floatation, the lift rod can become damaged.
Always set the lift rod bolt to the "top" position if a bottom link floatation is not required to operate the implement.



835.870.030.060

Position: Below the rear window and on the roof hatch, cab interior

530.811.090.040

NOTE:
Emergency exit from the cab when the cab door will not open
If the cab door will not open, use the roof hatch or the rear window as an emergency exit.

Position: Right C-pillar, cab interior

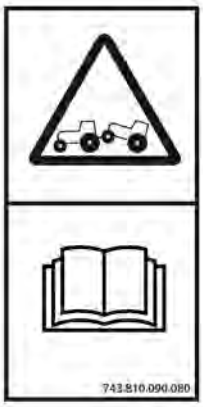
743.810.090.110

CAUTION:
Damage caused by incorrect electric welding
Improper welding can damage electronic components and interfere with their operation.
Always disconnect the battery before welding. Position the welder ground clamp as close as possible to the welding point. Pay attention to temperature-sensitive parts.
The maintenance manual contains all important information.

Position: Right C-pillar, cab interior

743.810.090.080

CAUTION:
Damage caused by incorrect towing
Towing in a gear position other than the towing position will damage the gearbox.
Before towing, ensure that the gearbox is in the towing position.
The Operator's Manual contains all important information.



Position: Front of vehicle, on air-conditioning condenser

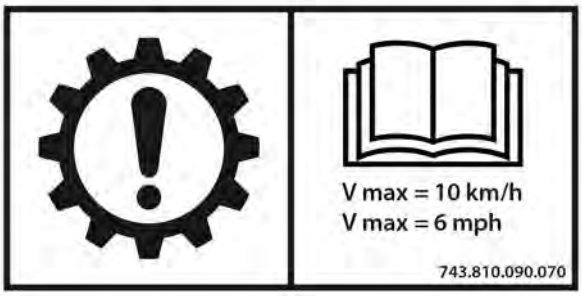
650,503,410,360

NOTE:
System contains the prescribed air conditioning medium R134a
Use only the legally prescribed air conditioning medium R134a (1,1,1,2-Tetrafluorethane).

Position: Right mudguard, cab interior

743.810.090.070

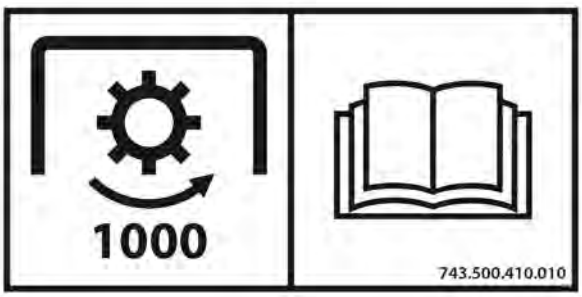
CAUTION:
Damage caused by incorrect towing
To prevent transmission damage being caused by incorrect towing, always observe all important information in the towing instructions in the Operator's Manual.
Specifically, the vehicle should be towed only over a limited distance and at a speed of below 10 km/h or 6 mph.



Position: PTO stub shaft protection

743,500,410,010

NOTE: *Note the speed and rotational direction of the PTO. Refer to the Operator's Manual when mounting or connecting implements.*



Position: Roof lining, centre right

743.810.090.120

NOTE:
Recalibration of the tachograph after a tire change Always calibrate the tachograph after a rear tire change. Failure to do so can cause incorrect tachograph recordings.
The Operator's Manual contains all important information.

Position: Rear of vehicle, left-hand side of ball holder

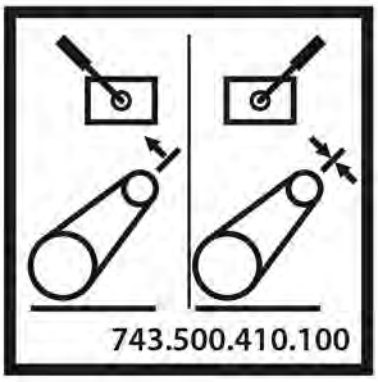
743,500,410,130

NOTE: *Refer to the Operator's Manual when mounting implements on the rear power lift.*

Position: Rear of tractor, above hydraulic couplings

743,500,410,100

NOTE: *Switch lever for rear power lift, single-acting or double-acting*



Position: Engine, on the valve cover

411.201.010.010

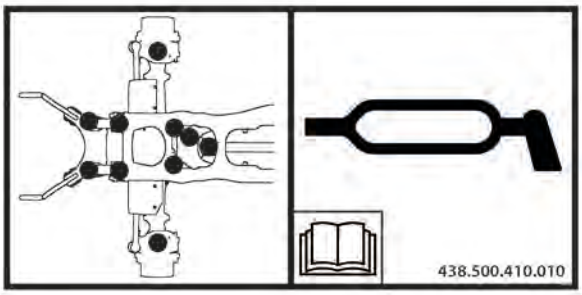
NOTE:
Do not re-tighten the cylinder head bolts During initial setup and after repair work, the cylinder head bolts are tightened in accordance with the relevant instruction sheet and must not be re-tightened.

411.201.010.010

Position: Left side of engine, at the front above the front axle

438,500,410,010

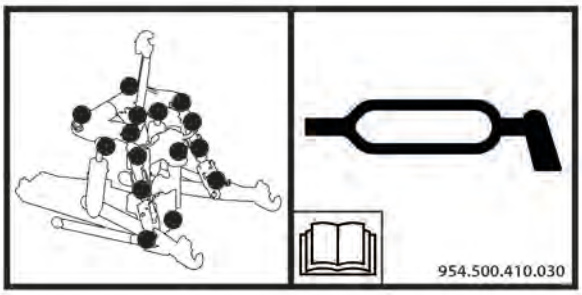
Front lubrication points, see maintenance instructions



Position: On the right at the back on inside of mudguard

954,500,410,030

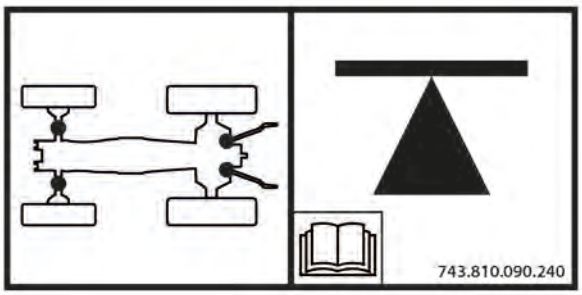
Rear lubrication points, see maintenance instructions



Position: Left entrance step

743,810,090,240

Jack points, see maintenance instructions



1.1.8 Change wheels

DANGER:
Secure the tractor to prevent it rolling.

DANGER:
Always use support stands when working on the vehicle

WARNING:
Make sure that the surface on which jack is placed is flat, solid and non-slip. Do not place wooden blocks or similar supports under the jack. Otherwise, the vehicle may fall off the jack and seriously injure you.

WARNING:
Do not start the engine at any time while changing wheels.

WARNING:
The jack is only intended to lift the vehicle for a short period of time while wheels are being changed.

WARNING:
Make sure that the permissible vertical load capacity and lifting height of the jack are not exceeded.

WARNING:
Extra equipment such as wheel weights, twin tires etc. must be removed before changing a wheel.

If you do not position the jack under the jacking point correctly, the vehicle

- may fall off the jack
- and you or other individuals
- may be injured.

Instructions for using wheel nuts

- Replace any wheel nuts that are damaged or showing signs of rust.
- Never oil or grease wheel nuts. Lubricated wheel nuts can come loose from the wheel hub.
- Only use wheel nuts that are intended for use with the wheel and vehicle concerned.
- Do not tighten wheel nuts with the vehicle raised. The vehicle may tip over
- After changing the wheels, retighten wheel nuts after 10 running hours and check that tightening torque is as specified (see technical data).

Support points for jack and support stands

Front support points

(A) Support points for the jack.

(B) Support points for the support stands

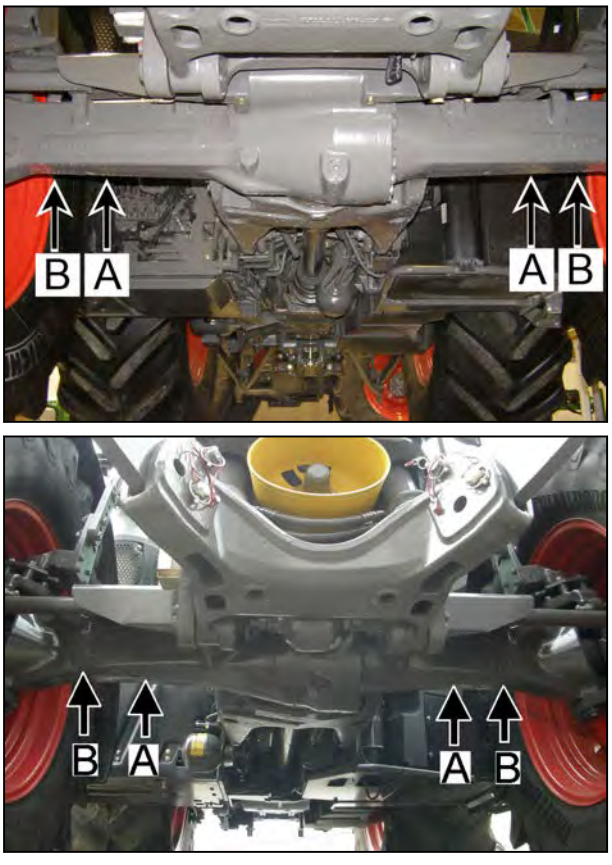


Fig. 4

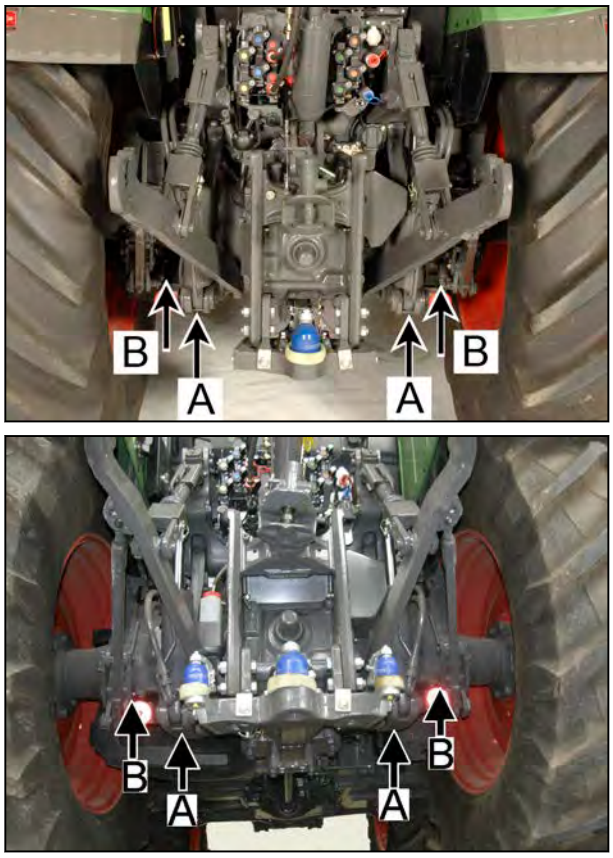


Fig. 5

Marking on tractor

Some of the suitable support points are marked on the tractor and are also indicated by this decal at the entrance.

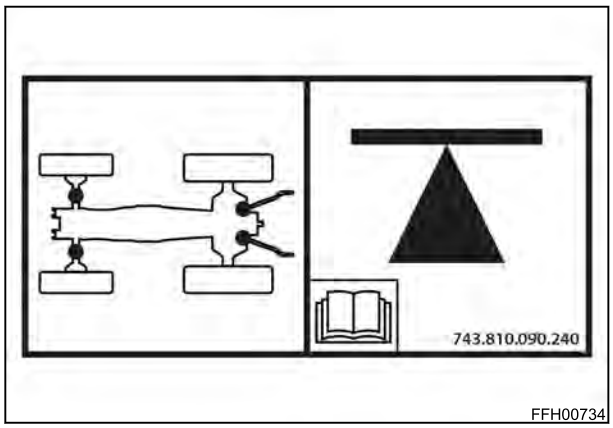


Fig. 6

1.1.9 Location of the identification plates

Location of the identification plates

Vehicle rating plate

On the right-hand side of the frame

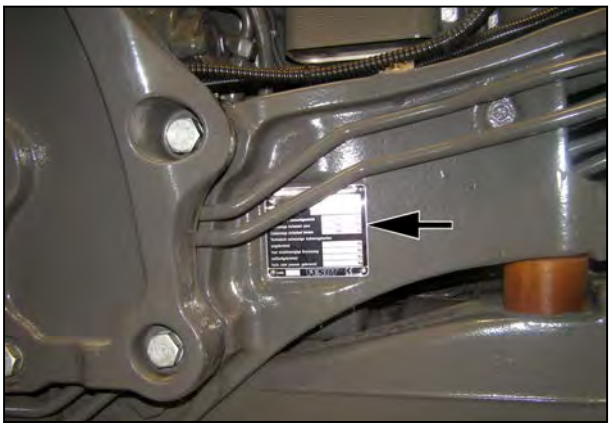


Fig. 7

Stamped chassis number

On the right-hand side of the frame, at the front

Fig. 8

Front axle rating plate

Right-hand side, on front axle

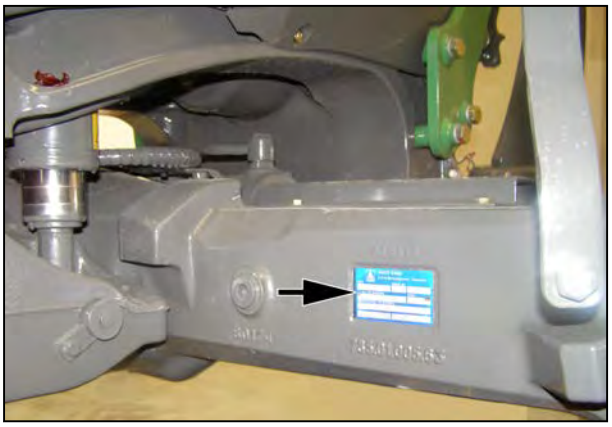


Fig. 9

Diesel engine rating plate

At the top of the valve cover and

on the right-hand side of the crankcase

Fig. 10

Transmission rating plate

On the right-hand side of the transmission housing, behind the heat exchanger

Fig. 11

Vario transmission insert rating plate

At the top of the Vario transmission insert

Remove cab, remove transmission cover

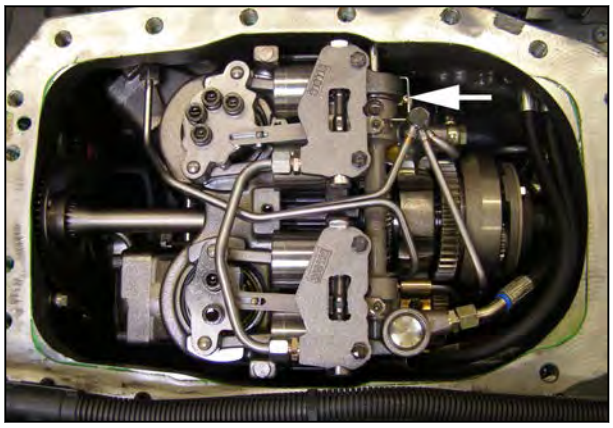


Fig. 12

Cab rating plate

In the cab, on the left-hand B-pillar between the panel and the side plate

Fig. 13

Trailer frame rating plate

NOTE:
See also: Operating Manual

On the right-hand side of the trailer frame

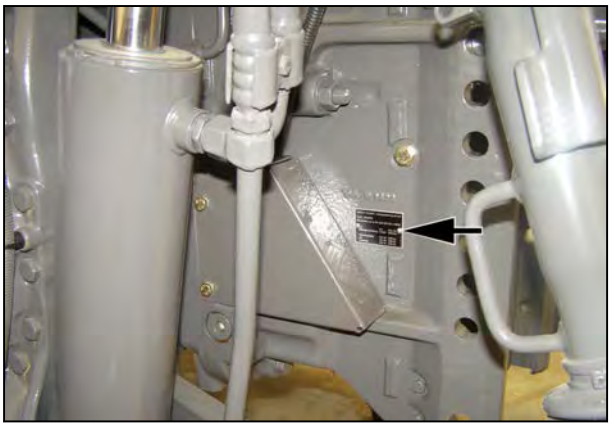


Fig. 14

Automatic trailer hitch rating plate

NOTE:
See also: Operating Manual

On the trailer hitch

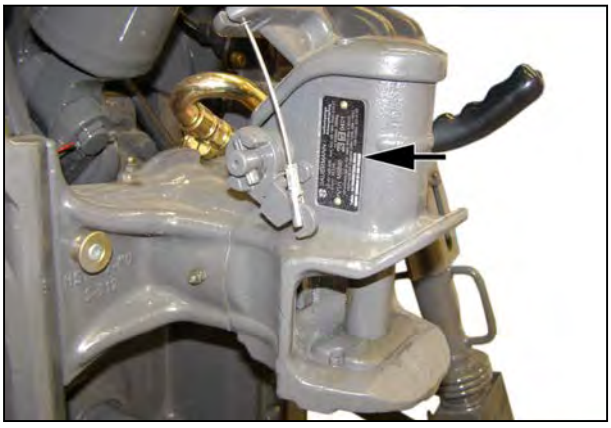


Fig. 15

Ball-type coupling (height adjustable) rating plate

NOTE:
See also: Operating Manual

On the ball-type coupling

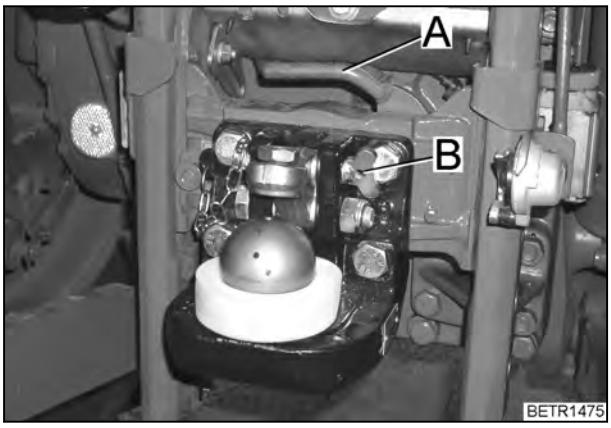


Fig. 16

Ball-type coupling rating plate

NOTE:
See also: Operating Manual

On the ball-type coupling

Fig. 17

Draw bar rating plate

NOTE:
See also: Operating Manual

On the draw bar

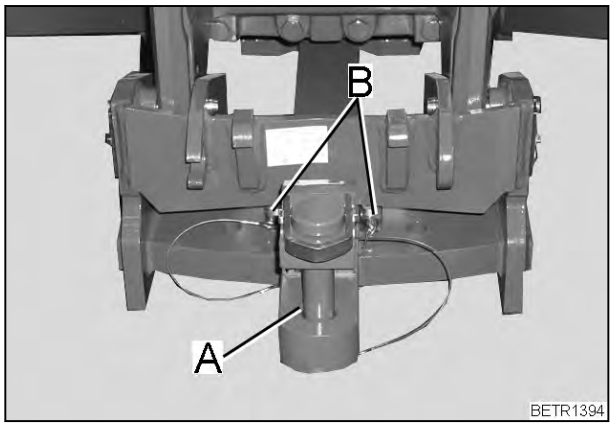


Fig. 18

Piton Fix rating plate

NOTE:
See also: Operating Manual

On the Piton Fix

Fig. 19

Hydraulic trailer hitch rating plate

NOTE:
See also: Operating Manual

On the hydraulic trailer hitch

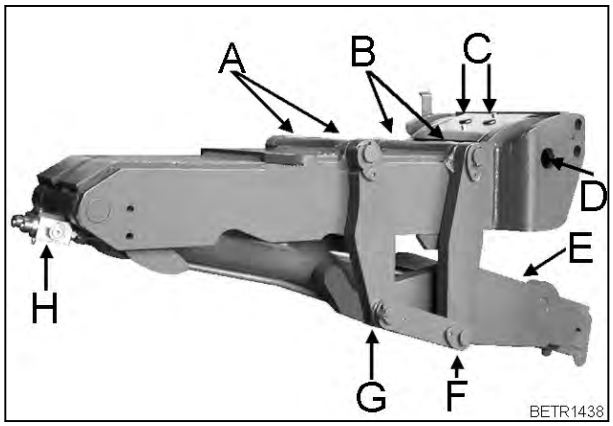


Fig. 20

1.2 Technical specification

1.2.1 Technical data: 0000 general

Technical data: Dimensions and weights				
Tractor type	**512 Vario**	**513 Vario**	**514 Vario**	**516 Vario**
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
Weights				
Unladen weight	6050 kg	6050 kg	6400 kg	6400 kg
Permissible overall weight	10500 kg			
Max. permissible front axle load, 40 km/h as per vehicle licensing regulations	4800 kg			
Max. permissible front axle load, 8 km/h	8000 kg			
Max. permissible rear axle load	8500 kg			
Permissible vertical load on trailer coupling	2000 kg			
Permissible vertical drawbar load for a pick up hitch	3000 kg			
Dimensions				
Front tires	540/65/R28			
Rear tires	650/65R38			
Overall length (with front power lift)	4569 mm			
Overall width:	2501 mm			
Overall height with cab	2965 mm			
Ground clearance (under front axle)	545 mm			
Wheelbase	2560 mm			
Min. turning radius	5.50 m			
Front axle flange width	1860 mm			
Rear axle flange width	1716 mm			
Standard track front	1880 mm			
Standard track rear	1856 mm			
Front bolt pitch-circle diameter	275 mm			
Front axle bolt and thread	8 M18 x 1.5			
Rear bolt pitch-circle diameter	275 mm			

Technical data: Dimensions and weights				
Tractor type	**512 Vario**	**513 Vario**	**514 Vario**	**516 Vario**
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
Rear axle bolt and thread	8 M22 x 1.5			
Rear axle ratio	i = 34.2			
Front axle ratio	i = 11.7			
Driving noise				
External noise according to 2009/63 EC	80 dB(A)	80.5 dB(A)	81 dB(A)	80.5 dB(A)
Internal noise according to 2009/76 EC	63 dB(A)	64 dB(A)	63.5 dB(A)	66 dB(A)
Whole body vibration intensity on operator's seat according to 78/764/ EEC	< 1.25 m/s²			
Tightening torques				
Wheel nuts (front)	275 Nm			
Rear wheel nuts	450 Nm			
Wheel weights M16- 8-8	210 Nm			

1.2.2 Technical data: 1000 transmission

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Transmission oil (Vario transmission)				
Oil grade	FENDT Extra Trans 10W-40 or STOU SAE 10W-40 STOU SAE 15W-40			
Transmission, initial fill	approx. 44 l			
Transmission, subsequent fills	approx. 36 l			
Oil quantity between Min. and Max. marks	approx. 2,5 l			
Oil change interval	2000 operating hours /2 years			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	435/../	436/../	437/../	438/../
Vario: continuously variable transmisssion				
Gearbox	ML 90			
Transmission unit (Vario insert)	ML 90			
Travel range	I (Field)			
	II (Road)			
Speed (forwards)				
Speed range I (Field)	0,02 km/h to 24 km/h			
Speed range II (Road)	0,02 km/h to 50 km/h			
Speed (backwards)				
Speed range I (field)	0,02 km/h to 17 km/h			
Speed range II (road)	0,02 km/h to 33 km/h			
Acceleration rate I (if the joystick is touched once at rated engine speed)	0,02 km/h to 0,5 km/h (adjustable)			
Acceleration rate II (if the joystick is touched once at rated engine speed)	0,5 km/h			
Acceleration rate III (if the joystick is touched once at rated engine speed)	1,0 km/h			
Acceleration rate IV (if the joystick is touched once at rated engine speed)	2,0 km/h			
Transmission gearbox pressures with transmission oil temperature greater than 40 °C **NOTE:** *See also Workshop Manual (Chapter 1005 Reg. E – Measuring transmission pressure)*				
Servo pressure at 2000 rpm engine speed (measuring point PU)	27 bar ± 2,5 bar			
System pressure at 2000 rpm engine speed (measuring point P)	26 bar ± 2,5 bara			
Feed pressure at 2000 rpm engine speed (measuring point ES)	24 bar ± 2,5 bar			
Discharge pressure at 2000 rpm engine speed (measuring point AS)	16 bar ± 2,5 bar			
Lubrication pressure at 2000 rpm engine speed (measuring point SM)	4,6 bar ± 0,7 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	435/../	436/../	437/../	438/../
Vario: continuously variable transmisssion				
Transmission gearbox pressures with transmission oil temperature greater than 80 °C **NOTE:** *See also Workshop Manual (Chapter 1005 Reg. E – Measuring transmission pressure)*				
Servo pressure at 2000 rpm engine speed (measuring point PU)	26 bar ± 2,5 bar			
System pressure at 2000 rpm engine speed (measuring point P)	25 bar ± 2,5 bar			
Feed pressure at 2000 rpm engine speed (measuring point ES)	15 bar ± 2,5 bar			
Discharge pressure at 2000 rpm engine speed (measuring point AS)	12 bar ± 2,5 bar			
Lubrication pressure at 2000 rpm engine speed (measuring point SM)	3 bar ± 0,5 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	435/../	436/../	437/../	438/../
Rear axle				
TYPE	HA 90			
Oil type for drive axle	SAE 85W-90			
Oil quantity for drive axle	each side 10 l			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	435/../	436/../	437/../	438/../
Clutch				
Electrical actuation				

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
AWD				
hitch	Wet multiple disc clutch			
Clutch actuation	electro. / hydraulic			
Clutch pressure: Clutch disengaged	25 bar + 2,0 bar			
Clutch engaged (Belleville spring force)	0 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Differential lock (rear)				
hitch	Wet multiple disc clutch			
Clutch actuation	electro. / hydraulic			
Clutch pressure: Differential lock disengaged	0 bar			
Differential lock engaged	25 bar + 2,0 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Rear wheel brake				
Type	Multi-disk brake, 10 inches (")			
Number of external/internal disks	10 pieces / 10 pieces			
Actuation	Via wheel brake cylinder (with brake servo)			
Rear brake adjustment:	Screw the adjustment screw onto the wheel brake cylinder until the rear wheel locks. Then turn the adjustment screw back by 1¾ turns			
Locknut tightening torque	40 Nm + 5 Nm			
Brake pedal valve rod play	0,5 Nm			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Hand brake				
Type	Spring-loaded cylinder acting on the rear axle brake			
	When the hand brake is applied, the 4WD engages			
Applying the hand brake	Acting mechanically on the wheel brake cylinder			
	Acting pneumatically (spring-loaded cylinder) on the wheel brake cylinder			
Hand brake opening pressure Pneumatic hand brake	6 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Front PTO transmission **1000 - standard or 540 - optional**				
Front PTO transmission oil Oil grade	FENDT Extra Trans 10W-40			
	or			
	Universal tractor oil (STOU)			
	SAE 10W - 40			
	SAE 15W - 40			
	acc. to API GL4			
Oil quantity: transmission oil inc. pressure filter **Note:** Oil level up to overflow at filler hole.	approx. 3,5 l			
PTO shaft profile	Splined shaft profile 1 3/8 inch (") (6 splines)			
Rotational direction of the front PTO	Right (clockwise) viewed in the direction of travel			
Engine speed for PTO rpm:				
1000 rpm (1000 PTO setting)	1939 rpm			
540 rpm (540 PTO otional setting)	1954 rpm			
PTO speed at engine rated speed (2100 rpm)				
1000 Setting	1083 rpm			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Front PTO transmission **1000 - standard or 540 - optional**				
540 Setting	580 rpm			
Max. permissible torque in front PTO with				
1000 Setting	749 Nm			
540 Setting	1300 Nm			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	**435/../**	**436/../**	**437/../**	**438/../**
Front PTO clutch				
System	Oil supply of front PTO transmission			
	Appropriate oil pump for front PTO clutch			
hitch	Wet multiple disk clutch with a brake disk			
Clutch actuation	electr. / hydraulic			
Front PTO disengaged				
System pressure	approx. 3 bar			
Clutch pressure	0 bar			
Front PTO engaged				
System pressure	approx. 18 bar			
Clutch pressure	approx. 18 bar			

Tractor type	512 Vario	513 Vario	514 Vario	516 Vario
Chassis no.:	435/../	436/../	437/../	438/../
Rear PTO transmission				
PTO shaft profile	**Splined shaft profile* (standard)** 1 3/8 inch (") (6 splines)			
Flange PTO (standard)	**Involute profile*** 1 3/8" x 21 splines *** Only for implements with a max. power requirement of 103 kW / 140 HP**			
	Splined shaft profile 1 3/4" (6 splines)			
	Involute profile 1 3/4" x 20 splines			
Rotational direction of the rear PTO	Right (clockwise) viewed in the direction of travel			
Engine speed for PTO rpm:				
540 rpm (540 PTO otional setting)	1933 rpm			
540 rpm (540E PTO setting)	1480 rpm			
750 rpm (540E PTO setting)	2070 rpm			
1000 rpm (1000 PTO setting)	1938 rpm			
1000 rpm (1000E PTO setting)	1540 rpm			
PTO speed at engine rated speed (2100 rpm)				
540 Setting	587 rpm			
540E setting	755 rpm			
1000 Setting	1084 rpm			
1000E setting	1363 rpm			
Max. permissible torque in rear PTO with				
540 Setting	2200 Nm			
540E setting	1650 Nm			
1000 Setting	1200 Nm			
1000E setting	1200 Nm			

Rear PTO clutch	
hitch	Wet multiple disk clutch with a brake disk
Clutch actuation	Electro-hydraulic
Clutch pressure: Rear PTO disengaged:	0 bar
Rear PTO engaged:	25 bar + 2,0 bar

1.2.3 Technical specification: Engine

Diesel engine (general specifications)				
Tractor type	**512**	**513**	**514**	**516**
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
Engine type	Deutz TCD 4.1 L04f 4 V			
Operating type:	4-stroke diesel - direct injection - water cooled			
Injection system	Deutz Common Rail (DCR) Electronic Engine Management EDC 17			
Fuel consumption at full load (approx. value) **Consumption = (HP/10) x 2 l/h** (in accordance with ECE R 24)	approx. 24 l/h	approx. 26 l/h	approx. 28 l/h	approx. 32 l/h
Pollutants — emission levels	2000/25EG - 2014/43/EU/EPA 4f			
Rotational direction when looking at the flywheel	Counterclockwise			
Engine weight	350 kg			
Rated power ECE R24 at 2100 rpm	81 kW/110 HP	88 kW/120 HP	99 kW/135 HP	110 kW/150 HP
Maximum power ECE R24 at 1900 rpm	92 kW/125 HP	99 kW/135 HP	110 kW/150 HP	121 kW/165 HP
Rated power EG 97/68 at 2100 rpm	91 kW/124 HP	98 kW/134 HP	109 kW/149 HP	120 kW/163 HP
Maximum power EG 97/68 at 1900 rpm	96 kW/131 HP	104 kW/141 HP	115 kW/156 HP	126 kW/171 HP
Maximum PTO power ECE R24 at 1800 rpm (engine speed)	79 kW/108 HP	86 kW/117 HP	97 kW/132 HP	108 kW/147 HP
Maximum torque ECE R24 at 1450 rpm	550 Nm	590 Nm	649 Nm	687 Nm
Idle speed	850 rpm			
Rated speed	2100 rpm			

Diesel engine (general specifications)				
Tractor type	**512**	**513**	**514**	**516**
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
No-load engine speed	2205 rpm ± 30 rpm			
Engine inclination **Note:** Ensure vehicle stability! Lengthwise in direction of travel high/low	25°			
Across left/right in direction of travel	25°			
external exhaust gas recirculation (AGRex)	No			
Electronically controlled wastegate turbocharger	No			
Common rail injection system	Yes			
Fuel supply	298 l			
Engine cooling	Water			
Intercooler	Air			
Engine oil cooler	Water			
Cylinder	4 (bank)			
Displacement	4038 cm^3			
Bore/stroke	101 mm/126 mm			
Firing order (cylinder # 1 at flywheel)	1 - 3 - 4 - 2			

Diesel engine (general specifications)				
Tractor type	**512**	**513**	**514**	**516**
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
Number of valves	2 (intake)/2 (exhaust)			
Compression ratio	18 : 1			
Compression pressure **Note:** The compression pressure is dependent on the starter speed during the measuring process and the elevation of the engine installation location. The limits cannot be set exactly. The compression pressure measurement is recommended to serve only as a comparison of all the cylinders in an engine. Where there is more than a 15% deviation, the cause should be determined by the removal of the appropriate cylinder unit.	25 bar to 30 bar			

Cooling system	
Chassis number 435/../... - 438/../....	
Cooling type	Fan with Visco coupling
Coolant quantity	approx. 31 l
Proportion of cooling system protective inhibitor min./max.	35 vol%/45 vol%
Max. permissible constant coolant temperature at engine outlet	110 °C
Cooling water pump	
Delivery pressure	1,2 bar
Flow rate	300 l/min
Power consumption	0.9 KW
Engine speed/(viscous fan) hub speed ratio	i = 1.36
Slip at fully engaged viscous fan	6% to 8%
max. viscous fan speed at rated speed (2100 rpm)	2856 rpm (without slip), 2685 rpm (at 6%)

engine lubrication	
Chassis number 435/../... - 438/../....	
Oil quantity	approx. 10 l
Difference in oil volume between "Min" and "Max" marks on dipstick	approx. 2 l
Oil grade	FENDT Ultra Grade 10W-40 UHPD
Max. oil temperature	125 °C
Minimum oil pressure at rated speed (2100 rpm) and oil temperature of 120°C	3,7 bar ± 0,4 bar
Oil pump (oil pressure at engine speed)	
n = 900 rpm	3,5 bar ± 0,4 bar
From n = 1900 rpm	3,7 bar ± 0,4 bar

Fuel system	
Chassis number 435/../... - 438/../....	
Fuel	**Diesel** in accordance with DIN EN 590
Note: When using diesel containing more than 0.5% sulfur, the oil change interval must be halved. See also tractor's Operator's Manual.	
Fuel tank capacity	280 l
AdBlue tank capacity:	31 l
Fuel pump Fuel primary pressure "low pressure" (Overflow valve in the Y091 dispensing unit)	approx. 6 bar
Fuel delivery rate (at rated engine speed of 2100 rpm) **NOTE:** *The delivery rate is dependent on:* • *Speed of the fuel transfer pump* • *Fuel temperature* • *Primary and counter pressure at the fuel delivery pump*	4,5 l/min

Injection system	
Chassis number 435/../... - 438/../....	
System	Deutz Common Rail (DCR)
Electronic engine management	Bosch EDC 17
High-pressure pump	Bosch PF 45-16
Injector	Bosch CRIN 2
Mapping field of regulated rail pressure (min/max)	350 bar to 1600 bar

Injection system	
Chassis number 435/../... - 438/../....	
Rail pressure relief valve (2-stage DBV) opening pressure/ holding pressure	1800 bar / 400 bar ... 980 bar
Mapping field of regulated start of delivery (SD)	Bosch EDC 17
Mapping of dependent pre-injection	Bosch EDC 17

Valves	
Chassis number 435/../... - 438/../....	
Number of intake valves	2
Number of exhaust valves	2
Valve clearance: intake valve/exhaust valve with a cold engine (below 80 °C)	75°/120° 0,3 mm/0,5 mm
Locknut on valve adjustment screw	20 Nm
Valve recess, intake valve (measured from the valve head to the cylinder head sealing surface)	0,9 mm +0,15 mm / -0,1 mm
Valve recess, exhaust valve (measured from the valve head to the cylinder head sealing surface)	0,9 mm +0,15 mm / -0,1 mm
Seat angle: intake valve/exhaust valve	20°/30°
Valve head diameter: intake valve/exhaust valve	34,4 mm/33,2 mm
Inlet opens after BDC	139.5°
Inlet closes after BDC	67.5°
Outlet opens before TDC	84°
Outlet closes after TDC	48°

Turbocharger	
Chassis number 435/../... - 438/../....	
Turbocharger type	Pneumatically controlled wastegate turbocharger
Boost pressure at maximum power (overpressure)	1800 mbar
Maximum intake vacuum at rated speed	-30 mbar to -60 mbar

Pistons (installation mark on the piston head)	
Chassis number 435/../... - 438/../....	
Piston diameter	101 mm
When piston protrusion (use cylinder head gasket with 1 holes)	0,33 mm to 0,55 mm
When piston protrusion (use cylinder head gasket with 2 holes)	0,56 mm to 0,65 mm
When piston protrusion (use cylinder head gasket with 3 holes)	0,66 mm to 0,76 mm
Piston ring 1 end gap (keystone ring) **Note:** The **TOP** mark faces the comBUStion chamber	0,4 mm (wear limit)
Piston ring 2 end gap (tapered ring) **Note:** The **TOP** mark faces the comBUStion chamber	2,0 mm (wear limit)
Piston ring 3 end gap (oil control ring)	1,15 mm (wear limit)
Piston ring 1 axial play (keystone ring)	Measure using a trapezoidal groove wear gage
Piston ring 2 axial play (tapered ring)	0,15 mm (wear limit)
Piston ring 3 axial play (oil control ring)	0,1 mm (wear limit)

Cylinder bore	
Chassis number 435/../... - 438/../....	
System	The piston runs directly in the crankcase. Hardened contact surface.
Bore (diameter, normal)	101 mm
Bore (diameter, repair stage)	101,5 mm

Torque values: diesel engine (DEUTZ TCD 4.1)	
Chassis number 435/../... - 438/../....	
Cylinder head bolts: • Sealing surfaces (cylinder head/crankcase), oil-free. • Screws oiled. • Tighten crosswise from interior to exterior. **Note:** Cylinder head bolts can be used a maximum of 3 times with written confirmation; otherwise replace each time they are loosened.	Stage 1: 40 Nm (pre-load value) Stage 2: 70 Nm (pre-load value) Stage 3: +90° (1st re-tightening angle) Stage 4: +90° (2nd re-tightening angle)
Cylinder head cover	8,5 Nm
Crankshaft main bearing cap	Stage 1: 50 Nm (pre-load value) Stage 2: +90° (re-tightening angle) Stage 3: +90° (re-tightening angle)
Locknut (hexagon socket) to the valve adjustment screw	20 Nm
Valve cover to rocker arm housing	9 Nm
Rocker arm housing to cylinder head	20 Nm
Upper rocker arm shaft to rocker arm housing	10 Nm
Lower rocker arm shaft to rocker arm housing	25 Nm
Big-end bearing cover to connecting rod Screws oiled **NOTE:** *Use new screws each time they are loosened.*	Stage 1: 30 Nm (pre-load value) Stage 2: +60° (re-tightening angle) Stage 3: +60° (re-tightening angle)
Lubricating oil sump to crankcase **NOTE:** *Note the length of the screws.*	30 Nm
Oil sump cap screw (replace copper washer)	55 Nm
Flywheel to crankshaft **NOTE:** *Tighten the bolts in the specified sequence.* *Use new screws each time they are loosened.*	
M10x1 x85	Stage 1: 30 Nm (pre-load value) Stage 2: +60° (re-tightening angle) Stage 3: +60° (re-tightening angle)
M10x1 x80	
M10x1 x75	
M10x1 x70	
M10x1 x55	
M10x1 x50	

Torque values: diesel engine (DEUTZ TCD 4.1)	
Chassis number 435/../... - 438/../....	
M10x1 x45	
M10x1 x40	
M10x1 x35	
M10x1 x30	Stage 1: 30 Nm (pre-load value) Stage 2: +60° (re-tightening value) Stage 3: +30° (re-tightening value)
V-belt pulley on crankshaft	
Note: Tighten the bolts in the specified sequence. Use new screws each time they are loosened.	
	30 Nm +10 Nm (pre-load value) stage 3: +60° (re-tightening value) stage 3: +60° (re-tightening value)
Flywheel housing M12/M16	99 Nm/243 Nm
Front cover	30 Nm
Injector clamp	20 Nm + 3 Nm
Cable connector on Y095 to Y098 (injector)	1,5 Nm
Grooved nut to cable connector	10 Nm

1.2.4 Technical data: 3000 front axle

Tractor type	512	513	514	516
Chassis number	**435/../**	**436/../**	**437/../**	**438/../**
Manufacturer	DANA Type 740/154			
Oil quality - Axle beam - Planetary final drives	LS 85W-90 SAE 85W-90 SAE 80W-90 API-GL5 Do not use STOU or any other multi-purpose oil			
Capacity				
Axle housing:	8.2 l			
Planetary final drives (each side)	0.7 l			
Drive	Central 4WD			

Tractor type	512	513	514	516
Chassis number	435/../	436/../	437/../	438/../
4WD engagement	Electrohydraulic (100%)			
	- Engaged upon application of the service brake and parking brake			
Differential lock	"Locomatic" self-locking differential			
	Electrohydraulic (100%)			

Tractor type	512	513	514	516
Chassis number	435/../	436/../	437/../	438/../
Steering angle	52°			
Oscillation angle	8° ± 1°			
Toe-in	0 to +2 mm			
Camber	1°			
Inclination	8°			
Castor	5°			
Overload slip clutch.	Wet multiple disc clutch			
Minimum dynamic slip torque	3200 Nm ± 10%			
Roll resistance of the pinion shaft bearing (measured without seals)	2 Nm to 2.5 Nm (200 Ncm... 250 Ncm)			

Tractor type	512	513	514	516
Chassis number	435/../	436/../	437/../	438/../
Swing arm	Longitudinal oscillation			
Spring travel	± 50 mm			
Oscillation angle	8° ± 1°			
Suspension cylinder diameter	70 mm			
Suspension piston rod diameter	60 mm			
Volumes of suspension accumulators	1 x 1.4 l			
Nitrogen fill pressure of suspension accumulators	60 bar			
Volume of anti-bounce accumulator	1 x 0.75 l			
Nitrogen fill pressure of anti-bounce accumulators	120 bar			

Tractor type	512	513	514	516
Chassis number	435/../	436/../	437/../	438/../
Pressure limiting (raise)	250 bar			
Min. axle load (suspension)	approx. 1500 kg			
Max. axle load (suspension)	approx. 5200 kg			

1.2.5 Technical data: 4000 steering

Tractor type	512	513	514	516
Chassis number	435/../	436/../	437/../	438/../
Front axle	740 / 156			
Steering unit	OSPD 60/120 LSRM (without VarioGuide equipment) OSPEDC 60/120 LSRM (with VarioGuide equipment)			
Operating pressure	200 bar			
Steering cylinder diameter	70 mm			
Steering piston rod diameter	40 mm			

1.2.6 Technical data: 5500 air conditioning system/8100 cab/8600 EPC control valve

NOTE:
The following specifications apply to: 435/../.... - 438../....

5500 - Air conditioning system

Air conditioning system (general)	
R 134a refrigerant (max.)	1100 g
PAG ND8 refrigerant oil (total) (supply qty 180 cm³) X902.013.573.000	50 ccm
S035 switch (high-pressure switch-on point) "Switch closed"	20 bar ± 3 bar
S035 switch (high-pressure switch-off point) "Switch open"	27 bar ± 2 bar
S035 switch (low-pressure switch-on point) "Switch closed"	2.1 bar ± 0.3 bar
S035 switch (low-pressure switch-off point) "Switch open"	2.0 bar ± 0.2 bar

Air conditioning system (general)	
Fan belt tension (strand tension) measured at the center point between pulleys, using Optibelt tension gage	> 300 N (650 N on initial setup)
Air conditioning compressor	Denso 10S 17
Air conditioning compressor displacement	188 ccm

8100 - Cab

Windscreen washer	
Capacity	approx. 9.9 l

8600 - EHR control valve

EPC control valve	
Model	Bosch EHR OBE Position-draft-mix control
B031/B032 draft sensing pin	90 KN
Operating pressure	200 bar

Rear power lift	
Lift cylinder, inner/outer diameter	2x 40 mm/90 mm
Lift cylinder stroke	247 mm
Three-point hitch	2/3
Lower links inside widths in accordance with Cat. 2/3	825 mm/965 mm
Distance between the lower linkage coupling points (spreading dimension)	870 mm/1010 mm
Continuous lifting power at mounting point	70.8 KN
Maximum lifting power at mounting point	77.80 KN

1.2.7 Technical data: 8800 compressed air system / 9000 electrical system / 9200 front power lift

NOTE:
The following specifications apply to: 435/../.... - 438/../....

8800 - Compressed air system

Compressed air system	
Capacity of air reservoir	15 l
Air compressor	Wabco Cylinder 1 Air cooled
Air compressor (displacement)	238 cm³
Working pressure	8.5 bar
Volume flow at rated engine speed	250 l/min
Antifreeze pump	Wabco
Antifreeze container volume	500 cm³

9000 Electrics

Electrical system	
Operating voltage	12 V
G001 battery (ProfiPlus)	12 V/180 Ah
G001 battery (Power)	12 V/100 Ah
G002 alternator	14.4 V/200 A
M001 starter	4.0 KW

9200 Front power lift

Hydr. actuation	
Operating pressure	200 bar
Lift cylinder diameters (piston rod/cylinder)	28 mm/63 mm
Lift cylinder stroke	218 mm

Front power lift	
ISO 730 three-point linkage attachment	Cat 2
Lower linkages inside width in accordance with standard	825 mm
Lower linkage catch hook clearance in accordance with standard	870 mm
Max. lifting power at coupling point	34.2 KN
Implement weight up to about (Center of gravity: 800 mm, 5° device pull-in)	2460 kg

1.2.8 Technical data: 9600 hydraulic equipment

NOTE:
The following specifications apply to: 435/../.... - 438../....