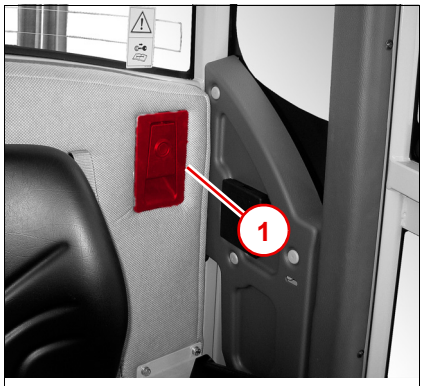
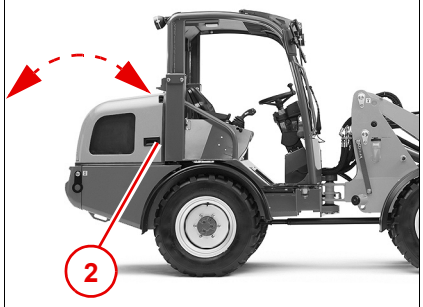
1.4 Maintenance accesses

Opening the engine cover





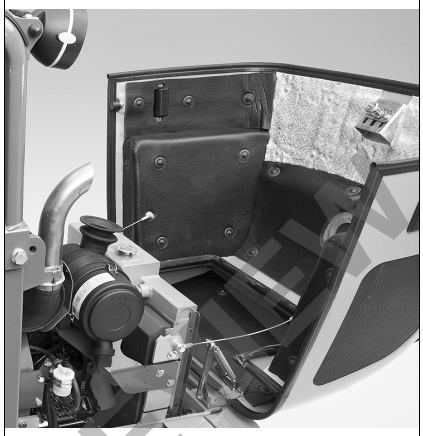


Fig. 16

CAUTION

Risk of injury due to hot and moving engine parts!

Hot and moving engine parts can cause injury.

- ► Do not open the engine cover if the engine is running.
- ► Let the engine cool down.
- ► Wear protective equipment.

NOTICE

Engine damage due to loose objects in the engine compartment.

- ► Remove all tools and objects from the engine compartment before closing the engine cover.

Open the engine cover with handle **2**.

1. Open the engine cover lock by pulling opener **1**.
   ➥ The engine cover is unlocked.
2. Raise the engine cover by pulling the handle.
   ➥ Tilt the engine cover backward.

Information

Close the engine cover by tilting it forward. The engine cover lock engages in the lock as it closes.

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E.3 Tightening torques

General tightening torques

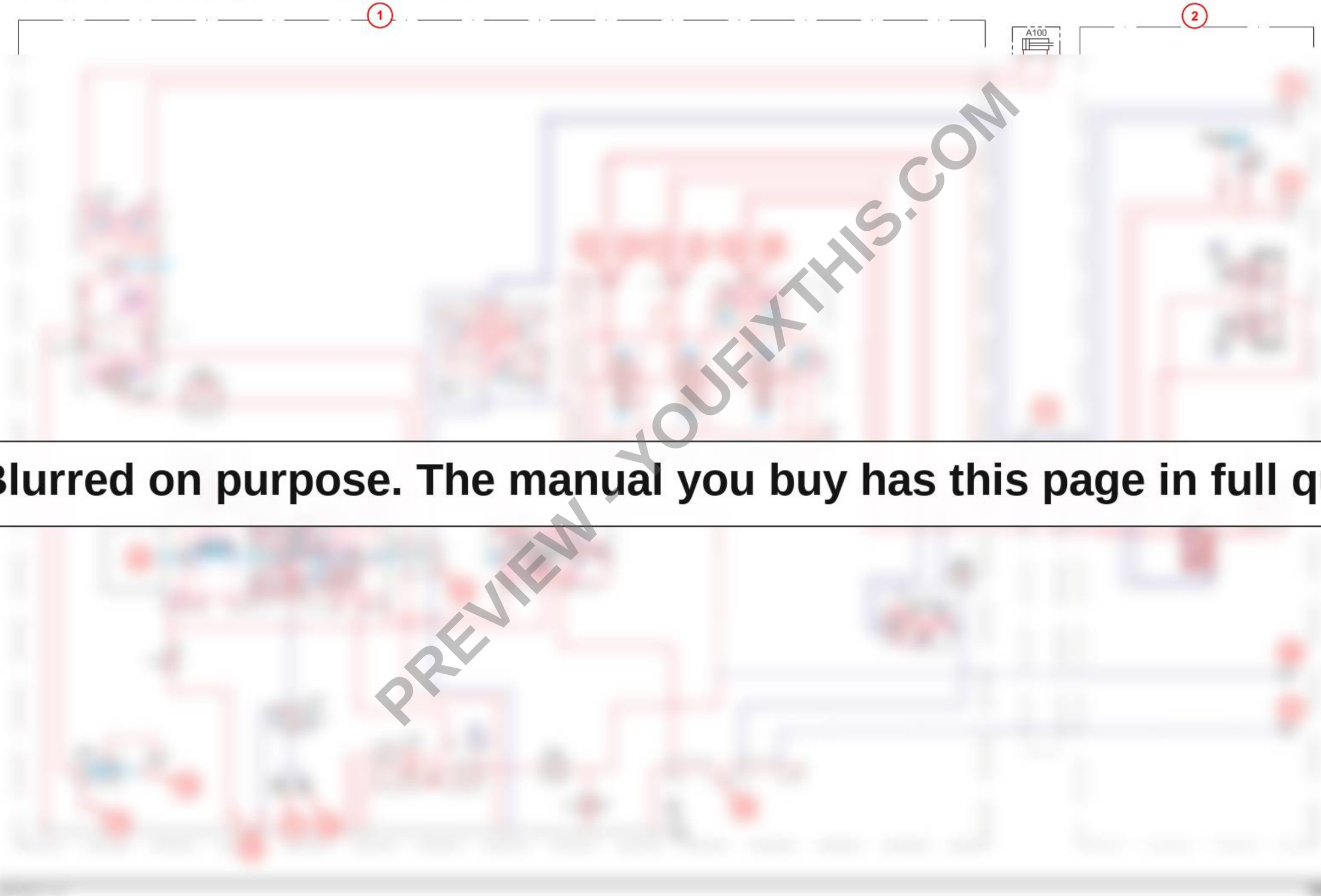
Screw dimensions	Tightening torques in Nm[1]

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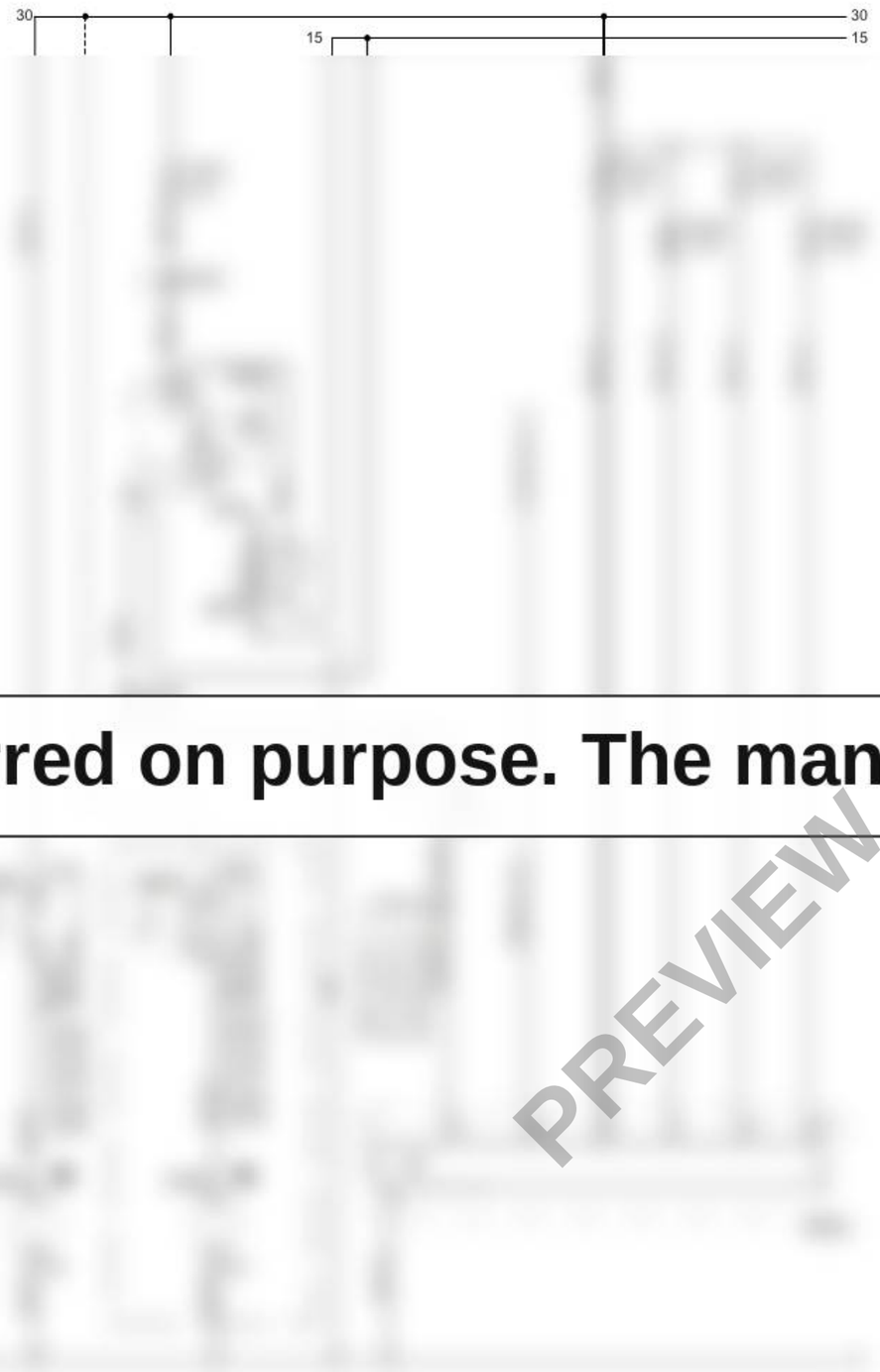
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8.16 Hydraulic circuit diagram HDM19/3 with HDS15/1



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9.7 Electrical diagram – Electronics, power supply (FG01-01)



Assign-ment	Designation

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12.2 Error code lists

Engine control unit Perkins 404F

Error code				Error setting condition (detection threshold)	Reaction Motor
SPN (component)		FMI (error type)			
SPN	SPN text	FMI	FMI text		
29	Accelerator pedal 2	3	Voltage too high	Above setting	-
29	Accelerator pedal 2	4	Voltage too low	Below setting	-
91	Accelerator pedal 1	3	Voltage too high	Above setting	-
91	Accelerator pedal 1	4	Voltage too low	Below setting	-
100	Oil pressure sensor	1	Oil pressure too low	Switch: On	-
102	Intake air pressure sensor	3	Voltage too high	33.3 bar and over 4.75 V	-
102	Intake air pressure sensor	4	Voltage too low	6.6 bar and below 0.25 V	-
108	Air-pressure sensor	3	Voltage too high	Above setting and over 4.75 V	- Incorrect soot load estimate - High exhaust-gas temperature - Low power
108	Air-pressure sensor	4	Voltage too low	4 bar and below 0.25 V	- Incorrect soot load estimate - High exhaust-gas temperature - Low power
110	Engine coolant temperature sensor	3	Voltage too high	Below −40 °C and over 4.85 V	- Limited engine speed and torque - Suppression of necessary regeneration - Increased idle speed - Engine start-up suppressed
110	Engine coolant temperature sensor	4	Voltage too low	Over 125 °C and below 0.08 V	- Limited engine speed and torque - Suppression of necessary regeneration - Incorrect idle speed in cold temperatures - Engine start-up suppressed
110	Engine coolant temperature sensor	15	Valid data, but above the normal range	Over 112 °C	- Limited engine speed and torque
168	Battery voltage	0	Valid data, but above the normal range	16.5 V	- Engine stop - Engine emergency stop - Suppression of necessary regeneration
168	Battery voltage	3	Voltage too high	Over 16.5 V	- Wrongly produced supply voltage for sensors and ECU - Engine speed fluctuating - Suppression of necessary regeneration
168	Battery voltage	4	Voltage too low	Under 6 V	- Wrongly produced supply voltage for sensors and ECU - Engine speed fluctuating - Suppression of necessary regeneration
172	Engine intake-air temperature sensor	3	Voltage too high	-40°C and over 4.85 V	- Engine start-up suppressed - Incorrect soot load estimate
172	Engine intake-air temperature sensor	4	Voltage too low	125 °C	- Engine start-up suppressed - Incorrect soot load estimate
190	Engine speed	0	Valid data, but above the normal range	High Idle + 500 rpm	- Engine stop - Engine emergency stop - Suppression of necessary regeneration

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1.2 Maintenance overview

Daily/weekly maintenance

Work to be performed by the operator	Daily	Every week
Clean the machine	•	
Clean the air filter	•	
Check the machine for general damage	•	
Check the coolant level	•	
Checking the engine-oil level	•	
Check the engine for leaks		•
Check the hydraulic oil level	•	
Check the tire condition and pressure		•
Check all bolts for tightness		•
Check the wheel bolts		•
Check the braking system for correct function	•	
Check the brake fluid		•
Check the washer system and wiper water level	•	
Check the seat belt	•	
Check the instruments and indicator lights, and the acoustic warning devices for correct function	•	
Check the electrical system and lights for correct function	•	
Check the brake/inching pedal for correct function	•	
Check the steering system	•	
Check control levers and switches for correct function	•	
Check the attachments	•	
Check the exhaust for malfunctions and excessive smoke		•
Perform grease lubrication according to the lubrication plan, including of the attachments		•
Check the protective ROPS/FOPS structure		•
Clean the preliminary separator of the fuel filter		•
Check the machine axles for leaks		•
Check the hydraulic oil and water radiator for leaks and dirt, clean it if necessary		•
Check the attachments for safety and correct function		•
Check the routing of the hoses, pipe lines and electric lines		•
Check the air filter and intake hose		•
Check the engine mounting and axle mounting		•
Perform a general safety check, *General safety check on page 1-21*		•

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Contents

E Introduction

E.1 Notice on this service manual E-1
Use of the service manual E-2
Explanation of symbols and abbreviations E-3
Repair instructions E-4
E.2 Technical data E-5
Engine E-5
Permissible inclination E-5
Traveling drive/axles E-6
Machine-travel hydraulics E-6
Brakes E-6
Tyres E-7
Steering system E-7
Operating hydraulics E-8
Coolant E-8
Vibration E-9
Weights E-10
Payload/load-carrying capacity/lift capacity E-10
Dimensions E-11
E.3 Tightening torques E-13
General tightening torques E-13
Specific tightening torques E-13
Torque values for metric coarse-pitch thread E-14
Torque values for metric fine-pitch thread E-15
Tightening torques for hydraulic screw connections and climate screw fixtures with taper connections and O-rings DIN 3865 ..... E-16
Tightening torques for hydraulic screw connections with cutting ring DIN 3861 ..... E-17
Tightening torques for hydraulic screw struts SDS E-18
Tightening torques for hydraulics rotating screw connections E-21
Tightening torques for hollow screws DIN 7643 ..... E-21
Tightening torques for adjustable hydraulic screw struts SDE E-22
Tightening torques for brake line screw connections E-24
Tightening torques for worm drive hose clamps E-24
Tightening torques for spring-loaded worm drive hose clamps E-24
E.4 Safety instructions E-25
Pay particular attention to the following E-25
Safety symbols and signal words E-25
Safety and Accident Prevention Regulations E-26
Safety instructions for repair work E-27
Safety instructions for work on the engine E-30
Safety instructions for work on the hydraulic system E-31
Safety instructions for work on the air conditioning system E-32
Safety instructions for work on traveling drive and axles E-33
Safety instructions for work on the braking system E-33
Safety instructions for work on the frame E-33
Safety instructions for work on the electrical system E-35
Safety instructions for work on the wheels E-35
E.5 Special tools E-36
Claws and extractors E-36
Clamp E-36

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E.4 Safety instructions

Pay particular attention to the following

To eliminate risks, the instructions in this service manual must be read and observed by every person using, servicing, repairing, maintaining or inspecting this machine.

In particular, read this section on safety.

Safety symbols and signal words

Explanation

The following symbol identifies safety instructions. It is used for warning against potential personal risk or danger.

DANGER

DANGER identifies a situation causing death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

WARNING

WARNING identifies a situation that can cause death or serious injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury or death.

CAUTION

CAUTION identifies a situation that can cause injury if it is not avoided.

Consequences in case of non-observance.

► Avoidance of injury.

NOTICE

NOTICE identifies a situation that causes damage to the machine if it is not observed.

► Avoidance of damage to property.

The warning and safety signs attached to the machine provide important information for safe operation. Compliance is for your safety.

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B Operation
Overview of control elements B-1
Indicating instruments B-3
Loader unit control lever B-4
Overview of rotary switches (option) B-5
Overview of switch panels B-5
B.1 Indicator lights and warning lights (overview) B-7

1 Maintenance
1.1 Information on maintenance 1-1
Responsibilities and prerequisites 1-1
Safety instructions 1-1
Battery master switch 1-5
1.2 Maintenance overview 1-6
Daily/weekly maintenance 1-6
Inspection schedules 1-7
Inspection intervals 1-10
Lubrication plan 1-13
1.3 Fluids and lubricants 1-15
Fluids and lubricants (overview) 1-15
Perkins engine 404D-22 (35.7 kW) 1-15
Perkins engine 404F-22 (35.7 kW) 1-16
Deutz engine TD2011L04w (55.1 kW) 1-16
1.4 Maintenance accesses 1-17
Opening the engine cover 1-17
Removing/installing the operator seat 1-18
Removing/installing the footwell cover panel 1-18
Removing/installing cover for rear wall cladding 1-19
Removing/installing filler cap for the control console 1-19
1.5 Cleaning and maintenance 1-20
Information on cleaning and maintenance 1-20
Information on cleaning 1-21
General safety check 1-21
1.6 Lubrication work 1-22
Lubrication 1-22
Lubricating with the central lubrication system (option) 1-22
Central lubrication system diagram 1-25
Installing the high-pressure hoses on the central lubrication system 1-26
Instructions for troubleshooting in case of central lubrication system blocking 1-27
Repairing a blocking distributor of the central lubrication system 1-28
Troubleshooting table for central lubrication system 1-29
1.7 Fuel system 1-30
Information on the fuel system 1-30
Fuel system 1-31
Refueling with diesel fuel 1-31
Water separator maintenance 1-33
Replace the filter element of the fuel filter (Perkins Motor) 1-34
Replace the fuel filter (Perkins Motor) 1-36
Bleeding the fuel system 1-37
1.8 Engine lubrication system 1-39
Replace the engine oil and engine oil filter 1-39
1.9 Cooling system 1-41
Information on the cooling system 1-41
Information on the coolant 1-41
Checking/adding/changing coolant 1-42
Checking the antifreeze mixture 1-43
Cleaning the cooling system 1-44

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Environmental protection

Ensure that all consumables and replaced parts are disposed of safely and with minimum environmental impact!

General Safety

- No modifications, additions or conversions which might affect safety may be performed on the machine without the manufacturer's approval. This also applies to the installation and the adjustment of safety devices and valves, as well as to welding work on load-bearing elements.
- Replace protective structures (ROPS or FOPS) if they – or parts thereof – are deformed or corroded or if they were modified!
- If the fastening points, the frame or the fastening gear are damaged, please contact the manufacturer. Do not try to repair, adjust or reuse damaged protective ROPS or FOPS structures.
- Only use original spare parts from the manufacturer for maintenance and repair of the loader.
- Repair work may only be performed by a dealer authorized by the manufacturer.
- Drain all components before shipping the machine in order to avoid damage, for example due to temperatures below 0°C/32°F.
- It is prohibited to change the nominal pressure of pressure relief valves without explicit authorization by the manufacturer!

Before repair/maintenance

- Clean the entire machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before performing maintenance/repair work. Use lint-free cleaning rags and do not use aggressive cleaning agents!
- Before cleaning the loader with water, steam jet (high-pressure cleaner) or other cleaning agents, cover or tape up all openings which – for safety and functional reasons – must be protected against penetrating water, steam or cleaning agents.
  Special care must be taken with electric components, the combustion air inlet and outlet openings of the engine, and the tank ports!
  After cleaning, remove all covers and tapes applied for that purpose!
- Prior to adjustment, cleaning, and maintenance work as well as rectifying functional disorders:
  - Stop the engine.
  - Switch off the battery master switch.
- Prior to adjustment, cleaning, and maintenance work as well as rectifying functional disorders of the hydraulic system, lower the attachment completely.
- Due to their function the machine drives are not automatically secured after stopping the engine.
- For adjustment work it may be necessary to rotate the drives. It is important to make sure that other persons cannot start the machine or rotate the drives.

Removing components

- Burn hazard due to hot parts or liquids! Do not remove components as long as the machine is at operating temperature!
- Clean components thoroughly before removing them!

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Perkins engine 404F-22 (35.7 kW)

Position	Capacity	Fluid	Specification
Fuel tank	55 liters (14.5 gal.)	Diesel fuel	EN590 (EU) BS 2869: 2010 category A2 (GB) ASTM 0975, category 20 S15 (USA)
Engine oil with filter	10.6 liters (2.8 gal.)	Engine oil SAE 10W40 ambient temperature -20 °C to +40 °C (-4 °F–104°F)	“Low-soot” engine oil API CJ-4 ACEAE9 ECF-3
Cooling system contents	10 liters (2.6 gal.)	Water with commercially available HD coolant/anti-freeze	HD coolant/antifreeze: ASTM D6210

Deutz engine TD2011L04w (55.1 kW)

Position	Capacity	Fluid	Specification
Fuel tank	55 liters (14.5 gal.)	Diesel fuel	ASTM D 2896
Engine oil with filter	10.5 liters (2.77 gal.)	Engine oil SAE 10W40 ambient temperature -20 °C to +40 °C (-4 °F–104°F)	API CG-4/API CH-4
Cooling system contents	10 liters (2.6 gal.)	Water with commercially available HD coolant/anti-freeze	HD coolant/antifreeze: ASTM D4985

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1.12 Hydraulic system

Information on the hydraulic system

CAUTION

Burn hazard due to hot hydraulic oil!

Hot hydraulic oil can cause burns to the skin.

- ► Release the residual pressure in the hydraulic system.
- ► Let the engine cool down.
- ► Wear protective equipment.

NOTICE

Risk of technical damage.

- ► Perform maintenance on the hydraulic system according to the maintenance intervals specified in this Operator's Manual.
- ► Ensure utmost cleanliness during maintenance on the hydraulic system.
  Dirt or water in the hydraulic oil can cause premature wear or failure of the entire hydraulic system.

Hydraulic oil radiator

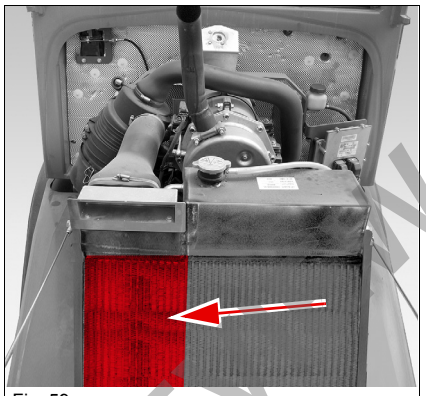


Fig. 59

The hydraulic oil radiator is located in a combined radiator. The radiator is installed in the engine compartment.

One part cools the hydraulic oil, the second part the engine. Check V-belt tension and condition if the hydraulic system overheats during longer work operation or at high outside temperatures. Also check whether the spaces between the radiator fins are clean and not blocked.

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Disassemble

WARNING

Contact with hot liquids and machine components

Death or serious injury due to skin burns.

- ► Wear suitable protective clothing.
- ► Let liquids and the diesel engine cool down.
- ► Observe instructions.

1. Drain the coolant – *see "Checking/adding/changing coolant" on page 1-42*.
2. Remove the engine cover – *see "Removing/installing the engine cover" on page 10-1*.
3. Remove the cover for the rear wall cladding – *see "Removing/installing cover for rear wall cladding" on page 1-19*.
4. Remove the water hose, air hose and flex pipe **1**.
5. Unplug the temperature sensor connector for the engine **2**.
6. Disconnect the starter and alternator **3** and place the cable to the side.

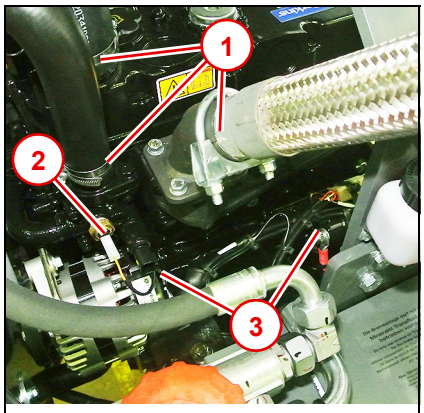


Fig. 86

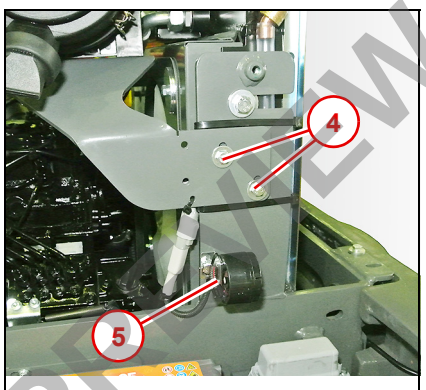


Fig. 87

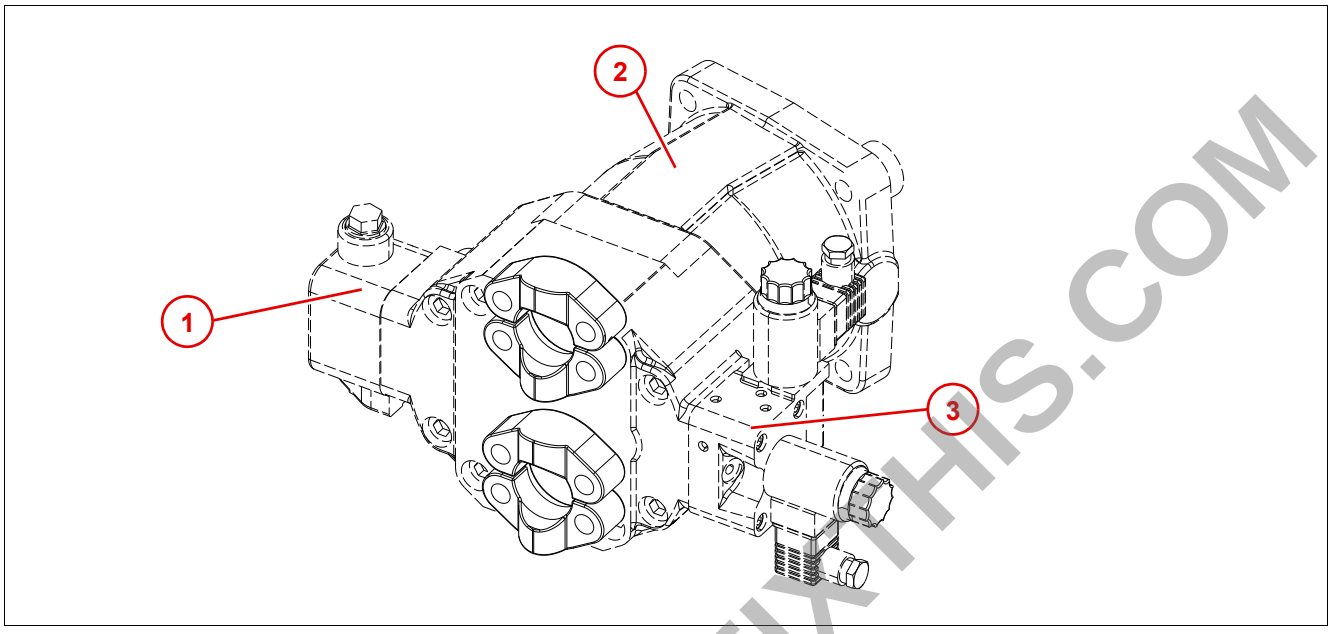
7. Disconnect the cable from the dirt indicator **5**.
8. Remove fastening screws **4**. Remove the bracket and air filter.

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4.4 Variable displacement motor

Overview



Component	Designation
1	Valve
2	Variable displacement motor
3	Control unit

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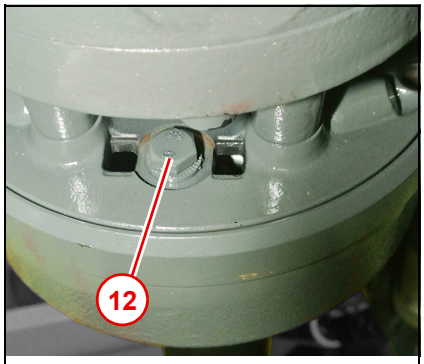


Fig. 165

23. Loosen the fastening screw of the adjuster **12**.
24. Hydraulically or mechanically actuate the brake several times so that the brake shoes or the adjustment center or align in the brake drum.
25. Tighten the fastening screw of the adjuster with the actuated brake with the prescribed torque of 53+5 Nm.
26. Set the adjustment. To do so, execute 10-15 braking operations per travel direction with the service or parking brake at medium travel speed (no violent braking).
27. Set the parking brake on the brake cable at the hand brake so that the brake lever can be pulled to the 5th / 6th notch level.
28. Check the brake drum for ease of movement.

Exchange the spring-loaded cylinder

WARNING

Danger of accident from manually triggering the electronic parking brake

A triggered electronic parking brake can cause the vehicle to roll away.

► Park the machine on firm, level and dry ground.

► Secure the machine to prevent it from rolling away (for example with wheel chocks, blocks).

1. Remove the starting key and secure the vehicle against unauthorized operation.
2. Slacken screw **1**.



Fig. 166

3. Disconnect the connection between the spring-loaded cylinder and the Bowden cable **2**.

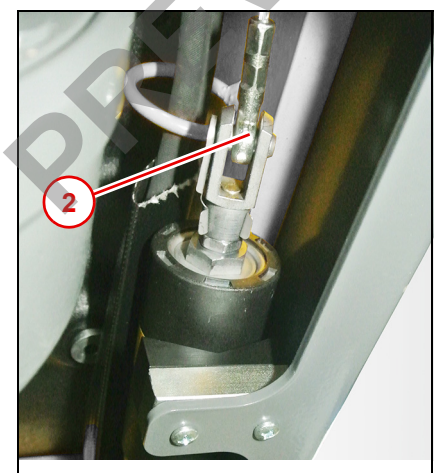


Fig. 167

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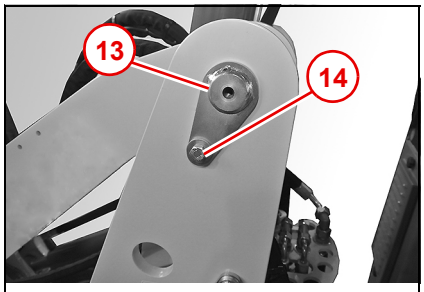


Fig. 224

14. Remove one screw **14** on each side.
15. Dislodge a pin **13** on each side.
16. Lift loader unit with suitable lifting gear.
17. Reverse the machine away carefully.

Install in the reverse order.

NOTICE

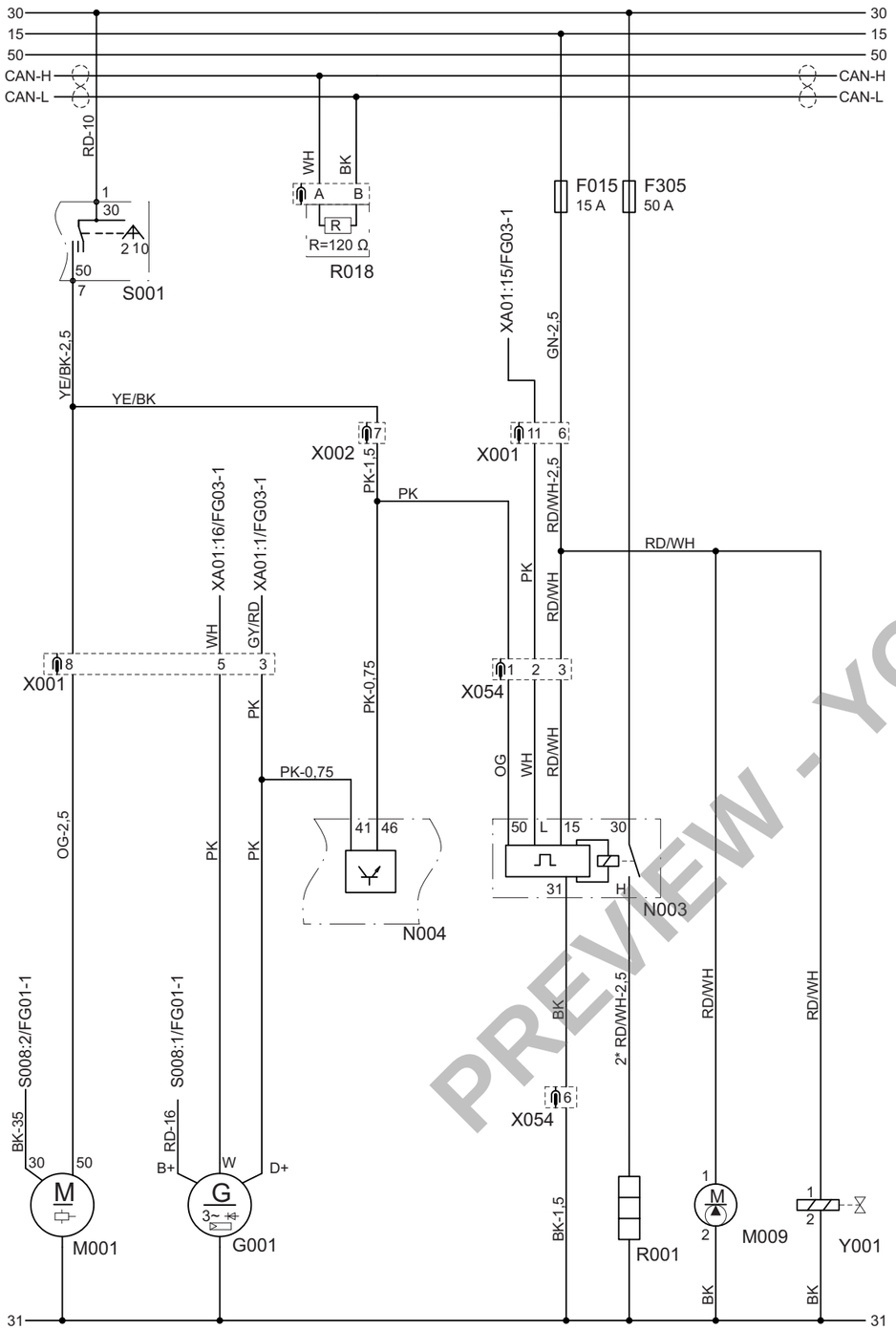
Pay attention to the following instructions for assembly:

- ► Apply a thin coat of grease to the pins and bearings before inserting the pins.
- ► Always use spring washers and washers for tightening the pins.
- ► After completing installation, apply grease to the cylinder and loader unit bearings.

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9.9 Electrical diagram – Perkins engine 404D-22 (FG02-01)



Assign-ment	Designation
F015	Cut-off solenoid, fuel pump, preheating relay
F305	Preheating system
G001	Generator
M001	Starter
M009	Fuel pump
N003	Preheating time control unit
N004	Traction electronics
R001	Glow plug
R018	Bus terminating resistance
S001	Preheating start switch
X001	Instrument panel
X002	Instrument panel
X054	Preheating system
Y001	Cutoff solenoid

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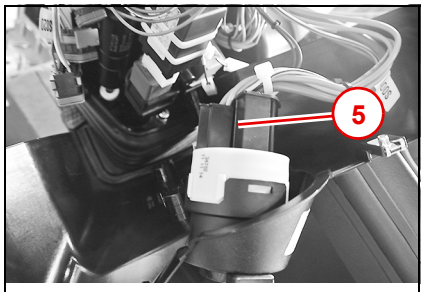


Fig. 278

9. Remove plug **5**.
10. Remove the starter.

Install in the reverse order.

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