DYNAPAC
Part of the Atlas Copco Group

Instructions manual

ICP224-BR1EN4.pdf
Operating & Maintenance

Rubber wheel roller
CP224/224W

Diesel engine
Cummins QSB 3.3

Serial number
10000501x0B001387 -

Translation of original instructions.

Reservation for changes
Printed in Sweden

Table of Contents

Introduction

The machine

Dynapac CP224 is a heavy rubber wheel roller in the 21 tonnes class, with a working width of 1800 mm. CP224 is also available in a Wide-Base version, with wider tires, which provides a working width of 2280 mm.

It has three guide wheels at the front, and four drive wheels at the back. The hydrostatic drives, flexible ballast solution, and a wide range of optional equipment mean that the machine is available in many different configurations.

Intended use

CP224/224W is mainly used together with other asphalt rollers for surface sealing. Thanks to its weight, it is also suitable for soil compaction.

Warning symbols

WARNING ! Marks a danger or a hazardous procedure that can result in life threatening or serious injury if the warning is ignored.

CAUTION ! Marks a danger or hazardous procedure that can result in damage to the machine or property if the warning is ignored.

Safety information

It is recommended to at least train operators in handling and daily maintenance of the machine in accordance with the instruction manual. Passengers are not allowed on the machine, and you must sit in the seat when operating the machine.

The safety manual supplied with the machine must be read by all roller operators. Always follow the safety instructions. Do not remove the manual from the machine.

We recommend that the operator reads the safety instructions in this manual carefully. Always follow the safety instructions. Ensure that this manual is always easily accessible.

Read the entire manual before starting the machine and before carrying out any maintenance.

Replace immediately the instruction manuals if lost, damaged or unreadable.

Ensure good ventilation (extraction of air by fan) where the engine is run indoors.

Prevent persons from entering or remaining in the danger area, i.e. a distance of at least 7 m (23 ft) in all directions from operating machines. The operator may allow a person to remain in the danger area, but should then observe caution and operate the machine only when the person is visible or has given clear indications of where he or she is.

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

General

This manual contains instructions for machine operation and maintenance.

The machine must be correctly maintained for maximal performance.

The machine should be kept clean so that any leakages, loose bolts and loose connections are discovered at as early a point in time as possible.

Inspect the machine every day, before starting. Inspect the entire machine so that any leakages or other faults are detected.

Check the ground under the machine. Leakages are more easily detected on the ground than on the machine itself.

THINK ENVIRONMENT ! Do not release oil, fuel and other environmentally hazardous substances into the environment. Always send used filters, drain oil and fuel remnants to environmentally correct disposal.

This manual contains instructions for periodic maintenance normally carried out by the operator.

Additional instructions for the engine can be found in the manufactuer's engine manual.

CE marking and Declaration of conformity

(Applies to machines marketed in EU/EEC)

This machine is CE marked. This shows that on delivery it complies with the basic health and safety directives applicable for the machine in accordance with machinery directive 2006/42/EC and that it also complies with other directives applicable for this machine.

A "Declaration of conformity" is supplied with this machine, which specifies the applicable directives and supplements, as well as the harmonized standards and other regulations that are applied.

Safety - General instructions

(Also read the safety manual)

1. **The operator must be familiar with the contents of the OPERATION section before starting the roller.**
2. **Ensure that all instructions in the MAINTENANCE section are followed.**
3. **Only trained and/or experienced operators are to operate the roller. Passengers are not permitted on the roller. Remain seated at all times when operating the roller.**
4. **Never use the roller if it is in need of adjustment or repair.**
5. **Only mount and dismount the roller when it is stationary. Use the intended grips and rails. Always use the three-point grip (both feet and one hand, or one foot and both hands) when mounting or dismounting the machine. Never jump down from the machine.**
6. **The ROPS (Roll Over Protective Structure) should always be used when the machine is operated on unsafe ground.**
7. **Drive slowly in sharp bends.**
8. **Avoid driving across slopes. Drive straight up or straight down the slope.**
9. **When driving close to edges or holes, make sure that at least 2/3 of the wheels are on previously compacted material.**
10. **Make sure that there are no obstacles in the direction of travel, on the ground, in front of or behind the roller, or overhead.**
11. **Drive particularly carefully on uneven ground.**
12. **Use the safety equipment provided. The seat belt must be worn on machines fitted with ROPS.**
13. **Keep the roller clean. Clean any dirt or grease that accumulates on the operator platform immediately. Keep all signs and decals clean and legible.**
14. **Safety measures before refueling:**
    - Shut off the engine
    - Do not smoke
    - No naked flame in the vicinity of the machine
    - Ground the filling device nozzle to the tank to avoid sparks
15. **Before repairs or service:**
    - Chock the wheels.
16. **Hearing protection is recommended if the noise level exceeds 85 dB(A). The noise level can vary depending on the equipment on the machine and the surface the machine is being used on.**

17. **Do not make any changes or modifications to the roller that could affect safety. Changes are only to be made after written approval has been given by Dynapac.**

18. **Avoid using the roller before the hydraulic fluid has reached its normal working temperature. Braking distances can be longer than normal when the fluid is cold. Refer to the operating instruction in the STOP section.**

19. **For your own protection always wear:**
    - helmet
    - working boots with steel toecaps
    - ear protectors
    - reflecting clothing/high visibility jacket
    - working gloves

Safety - when operating

Prevent persons from entering or remaining in the danger area, i.e. a distance of at least 7 m (23 ft) in all directions from operating machines. The operator may allow a person to remain in the danger area, but should then observe caution and operate the machine only when the person is visible or has given clear indications of where he or she is.

Slopes

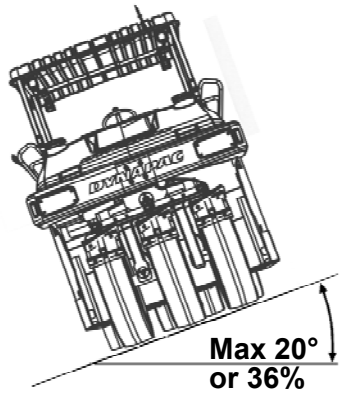


Fig. Operating on slopes

This angle has been measured on a hard, flat surface with the machine stationary.

The steering angle is zero, the tires have normal air pressure and all the tanks are full.

Always take into consideration that loose ground, the steering of the machine, different tire pressures, the operating speed and that an increase in the center of gravity can all cause the machine to topple even on slopes with lesser gradients than those specified here.

To exit the cab in an emergency, release the hammer on the rear right post and break the right opening side-windows.

It is recommended that ROPS (Roll Over Protective Structure) or a ROPS approved cab, is always used when driving on slopes or unsafe ground.

Where possible, avoid driving across a slope.

Always use the lowest gear when operating on slopes.

Where possible, avoid driving across slopes. Drive instead straight up and down sloping ground.

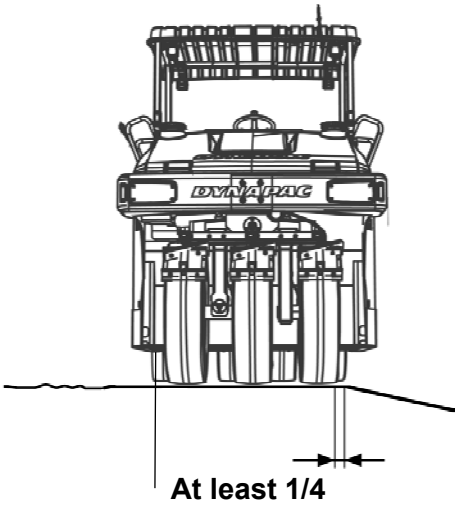


Fig. Position of wheels when driving near an edge

Driving near edges

When driving close to edges or holes, make sure that at least 1/4 of the outer tires are on the previously compacted material.

Safety (Optional)

Air conditioning

The system contains pressurized refrigerant. It is forbidden to release refrigerants into the atmosphere.

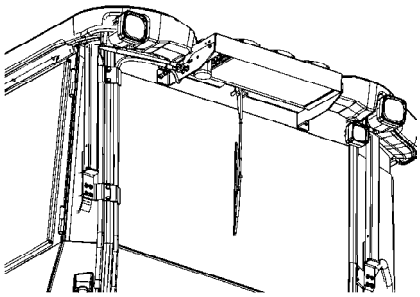


Fig. Air conditioning (ACC)

Work on the refrigerant circuit is only to be carried out by authorized companies.

The cooling system is pressurized. Incorrect handling can result in serious personal injury. Do not disconnect or undo the hose couplings.

The system must be re-filled with an approved refrigerant by authorized personnel when necessary. See decal on or in the vicinity of the installation.

Edge cutter (Optional)

The operator must make sure that nobody is in the area of operation while the machine is in use.

The edge cutter consists of rotating components and there is a risk of being crushed.

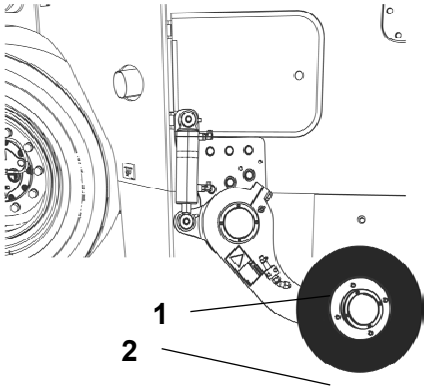


Fig. Edge cutter
1. Transport position
2. Operationing position

The tool must be returned to the transport position (raised position) (1) every time it has been used.

If the edge cutter and its parts are dismantled, make sure that it is set in a relieved position and resting on the ground.

Working lights - Xenon

Warning, high voltage!

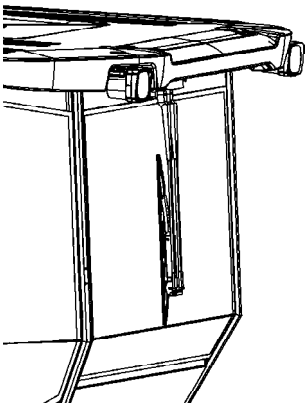


Figure. Xenon lighting on cab

The working lights of the Xenon type have a secondary high-voltage source.

Work on the lighting should only be conducted by an authorized electrician and with the primary voltage disconnected.

Contact a Dynapac dealer!

Warning, environmentally hazardous waste!

Working lights of the Xenon type include a discharge lamp that contains mercury (Hg).

A defective lamp is to be considered as hazardous waste and shall be disposed off as per local directives.

Special instructions

Standard lubricants and other recommended oils and fluids

Before leaving the factory, the systems and components are filled with the oils and fluids specified in the lubricant specification. These are suitable for ambient temperatures in the range -15°C to +40°C (5°F - 105°F).

Higher ambient temperatures, above +40°C (104°F)

For operation of the machine at higher ambient temperatures, however maximum +50°C (122°F), the following recommendations apply:

The diesel engine can be run at this temperature using normal oil. However, the following fluids must be used for other components:

Hydraulic system - mineral oil Shell Tellus S2V100 or similar.

Lower ambient temperature - Freeze risk

Make sure that the watering system is empty/drained of water (sprinkler, hoses, tank/s) or that anti-freeze has been added, to prevent the system freezing.

Temperatures

The temperature limits apply to standard versions of rollers.

Rollers equipped with additional equipment, such as noise suppression, may need to be more carefully monitored in the higher temperature ranges.

High pressure cleaning

Do not spray water directly onto electrical components or the instrument panels.

Place a plastic bag over the fuel filler cap and secure with a rubber band. This is to avoid high pressure water entering the vent hole in the filler cap. This could cause malfunctions, such as the blocking of filters.

Fire fighting

If the machine catches fire, use an ABC-class powder fire extinguisher.

A BE-class carbon dioxide fire extinguisher can also be used.

Roll Over Protective Structure (ROPS), ROPS approved cab

If the machine is fitted with a Roll Over Protective Structure (ROPS, or ROPS approved cab) never carry out any welding or drilling in the structure or cab.

Never attempt to repair a damaged ROPS structure or cab. These must be replaced with new ROPS structure or cabs.

Battery handling

When removing batteries, always disconnect the negative cable first.

When fitting batteries, always connect the positive cable first.

Dispose of old batteries in an environmentally friendly way. Batteries contain toxic lead.

Do not use a quick-charger for charging the battery. This may shorten battery life.

Jump starting (24V)

Do not connect the negative cable to the negative terminal on the dead battery. A spark can ignite the oxy-hydrogen gas formed around the battery.

Check that the battery used for jump starting has the same voltage as the dead battery.

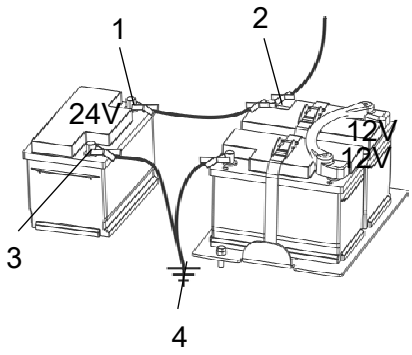


Fig. Jump starting

Turn the ignition and all power consuming equipment off. Switch off the engine on the machine which is providing jump start power.

Jump leads must have 24V.

First connect the plus terminal (1) on the auxiliary battery to the plus terminal (2) on the flat battery, then connect the minus terminal (3) to a suitable earth point (4) on the machine.

Start the engine on the power providing machine. Let it run for a while. Now try to start the other machine. Disconnect the cables in the reverse order.

Technical specifications

Vibrations - Operator station

(ISO 2631)

Vibration levels have been measured according to the operational cycle described in the EU directive 2000/14/EC on machines equipped for the EU market with operator seat in transport position.
Measured whole-body vibrations are below the action value of 0.5 m/s² as specified in Directive 2002/44/EC. (Limit is 1.15 m/s²)
Measured hand/arm vibrations also were below the action level of 2.5 m/s² specified in the same directive. (Limit is 5 m/s²)

Noise level

Sound levels have been measured according to the operational cycle described in the EU directive 2000/14/EC on machines equipped for the EU market with operator seat in transport position.

Guaranteed sound power level, L_{wA}	103	dB (A)
Sound pressure level at the operator's ear (platform), L_{pA}	85 ±3	dB (A)
Sound pressure level at the driver's ear (cab), L_{pA}	80 ±3	dB (A)

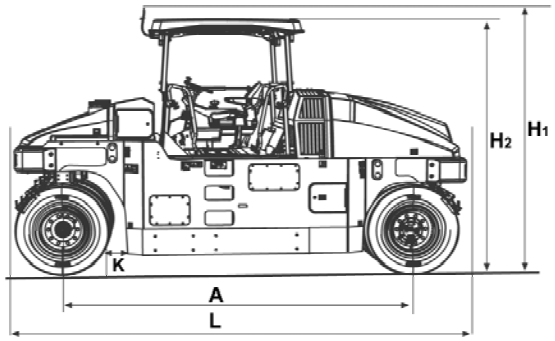
During operation the above values may differ because of the actual operational conditions.

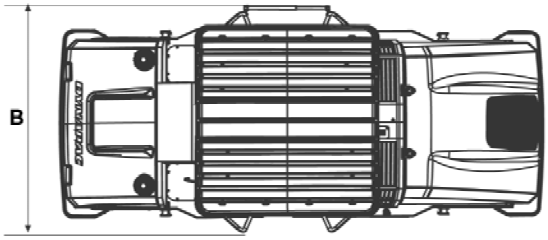
Electrical system

Machines are EMC tested in accordance with EN 13309:2000 'Construction machinery'

Technical specifications - Dimensions

Dimensions





Dimensions	mm	in
A	4000	157
B	2360	93
H_1	3344	132
H_2	2990	118
K	270	10.5
L	5180	204

Weights and volumes

Weights

Service weight, standard equipped roller incl. ROPS, EN500	9450 kg	20,840 lbs
Weight without ballast	9050 kg	19,955 lbs
Weight with ballast, wet sand	14150 kg	31,200 lbs
Weight with max ballast	21000 kg	46,305 lbs

Fluid volumes

Hydraulic oil reservoir	95 liters	100.4 qts
Hydraulic oil, system	35 liter	37 qts
Lubrication oil, diesel engine	7,4 liters	7.8 qts
Coolant, diesel engine	14,6 liters	15.4 qts
Fuel tank	210 liters	55.4 gal
T-gears	2 x 8 liters	2 x 8.5 qts
Water tank	415 liters	109.6 gal

Ballast box volume	2.2 m^3	77 cu. feet

Mixed ballast - max	11,6 tonnes	13 tons

The machine can use 4 steel blocks as ballast in the lower part of the frame. The bigger steel blocks (P/N 170226) weighs 2 tonnes (4,400 lbs) and the smaller steel blocks (P/N 170227) weighs 1,2 tonnes (2,245 lbs). They are used in pairs (P/N 170225). Either all 4, 2 at the front, or 2 at the back.

Use a suitable combination to achieve max ballast.

The roller's service weight consists of the weight of the roller plus the weight of the ballast.

Thicker layers require a heavier roller for compaction, than thinner layers do.

Working capacity

Compaction data

Tire pressure:		
- Without ballast	1400 kg	3.085 lbs
- With wet sand ballast	2100 kg	4.630 lbs
- With max ballast	3000 kg	6.615 lbs

General

Engine

Manufacturer/Model	Cummins QSB 3.3 T3	
Power (SAE J1995)	82 kW	99 hp
Engine speed	2200 rpm	

Electrical system

Battery	24V (2x12V 74Ah)
Alternator	24V 60A
Fuses	See the Electrical system section - fuses

Bulbs (if mounted)	Watt	Socket
Drive lights, front	75/70	P43t (H4)
Direction lights, front	21	BA9s
Side lights	5	SV8,5
Brake-Position lights	21/5	BAY15d
Direction lights, rear	21	BA15s
License plate light	5	SV8,5
Working lights	70	PK22s (H3)
	35	Xenon
Cab lights	10	SV8,5

Tightening torque

Tightening torque in Nm for oiled or dry bolts tightened with a torque wrench.

Metric coarse screw thread, bright galvanized (fzb):

STRENGTH CLASS:

M - thread	8.8, Oiled	8.8, Dry	10.9, Oiled	10.9, Dry	12.9, Oiled	12.9, Dry
M6	8,4	9,4	12	13,4	14,6	16,3
M8	21	23	28	32	34	38
M10	40	45	56	62	68	76
M12	70	78	98	110	117	131
M14	110	123	156	174	187	208
M16	169	190	240	270	290	320
M20	330	370	470	520	560	620
M22	446	497	626	699	752	839
M24	570	640	800	900	960	1080
M30	1130	1260	1580	1770	1900	2100

Metric coarse thread, zinc-treated (Dacromet/GEOMET):

STRENGTH CLASS:

M - thread	10.9, Oiled	10.9, Dry	12.9, Oiled	12.9, Dry
M6	12,0	15,0	14,6	18,3
M8	28	36	34	43
M10	56	70	68	86
M12	98	124	117	147
M14	156	196	187	234
M16	240	304	290	360
M20	470	585	560	698
M22	626	786	752	944
M24	800	1010	960	1215
M30	1580	1990	1900	2360

Wheel bolts

Bolt dimensions :	M20 (PN 4700792683)
Strength class :	10.9
Tightening torque :	Oiled: 494 Nm Dry: 620 Nm

Hydraulic system

Opening pressure	**MPa**
Drive system	33,0
Supply system	2,0
Control systems	16,0
Brake release	1,9

Automatic Climate Control (ACC) (Optional)

The system described in this manual is an AC/ACC type (Automatic Climate Control), i.e. a system that maintains the set temperature in the cab, provided windows and doors are kept closed.

Coolant designation: HFC-R134:A

Coolant weight when full: 1350 gram (2.98 lbs)

Machine description

Identification

Product identification number on the frame

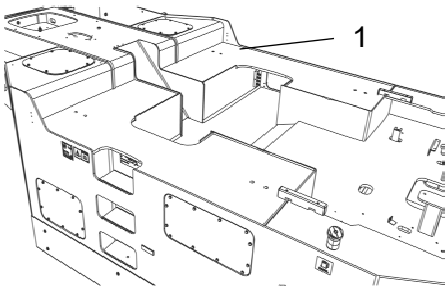


Fig. Front frame
1. PIN

The machine's PIN (product identification number) is punched on the right edge of the frame (1). This number is the same number as the machine plate's PIN (serial number).

Machine plate

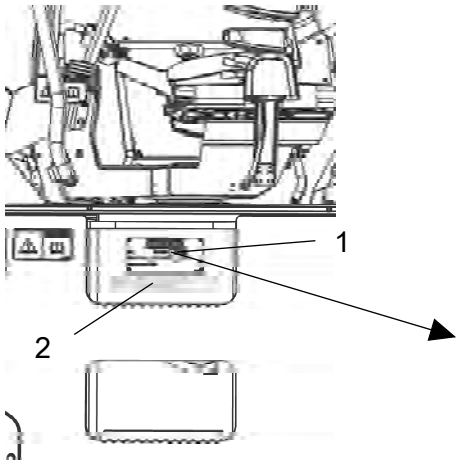
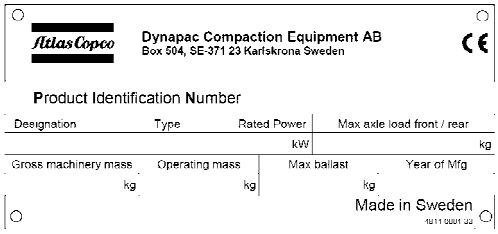


Fig. Operator platform
1. Machine plate
2. Engine plate

The machine plate (1) is fixed on the top step, on the left side of the operator platform.

The plate specifies the manufacturer's name and address, the type of machine, the PIN number (serial number), service weight, engine power and year of manufacture. (On machines supplied outside the EU, there are no CE markings and in some cases no year of manufacture.)



Please state the machine's PIN when ordering spares.

100	00123	V	0	A	123456
A	B	C	D	E	F

Explanation of 17PIN serial number

A= Manufacturer

B= Family/Model

C= Check letter

D= No coding

E= Production unit

F= Serial number

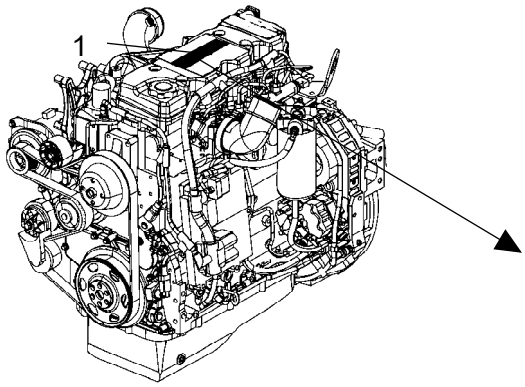


Fig. Engine
1. Type plate

Engine plates

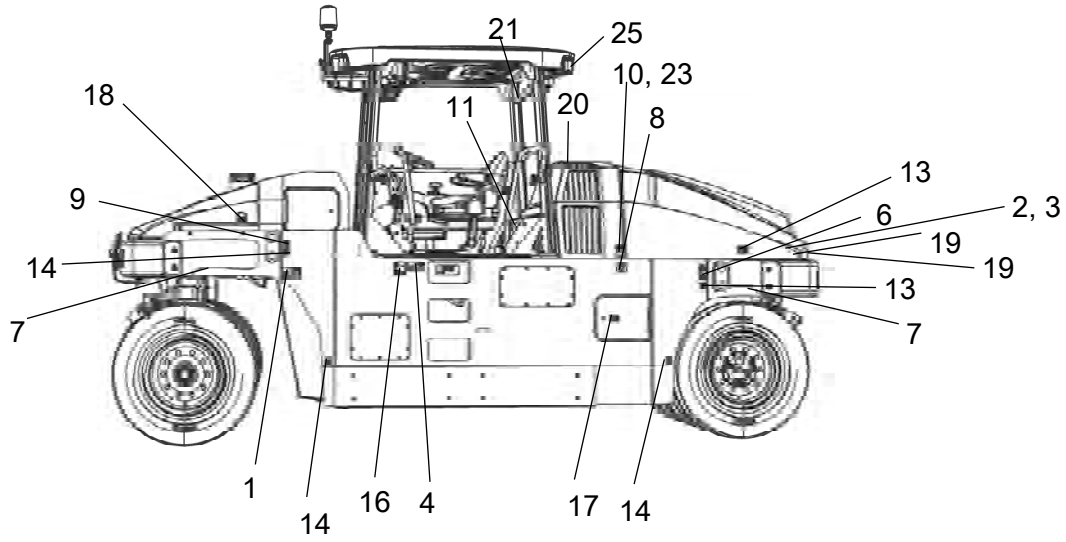
The engine's type plate (1) is located on the cylinder head cover and is accessible when the hood is opened.

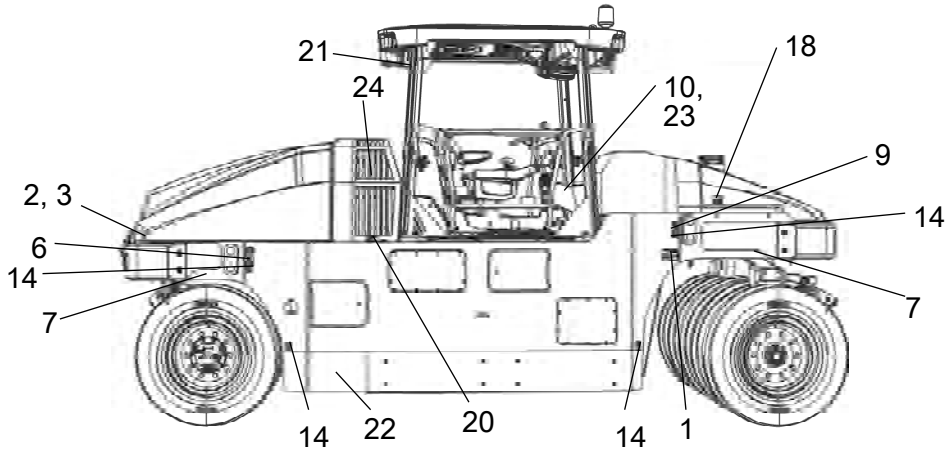
The type plate is also placed under the machine plate on the top step to the operator platform.

The plate specifies the type of engine, its serial number and the engine specification. Please specify the engine serial number when ordering spares. Refer also to the engine manual.

Cummins Engine Company, Inc. Columbus, Indiana USA 47202-3005 www.Cummins.com	Important engine information Model QSB3.3 LSN68300044 Gross rated hp/kW 99/74 at 2200 rpm
Warning: Injury may result and warranty is voided if fuel rate, rpm or altitudes exeed published maximum values for this model and application.	Low idle RPM 800 rpm Fuel rating FR 30232
This engine conforms to 20xx U.S EPA and California regulations for large non-road compression ignition engines as applicable. This engine is certified to operate on diesel fuel.	CPL XXXX Displacement: 3.261 L/199 in3 FEL EPA NOx: 4.7g/Kwh PM: 0.32g/Kwh
Timing-BTDC X degrees	
Valve lash Intake 0.014in/0.35 mm (cold engine) Exhaust 0.020in/0.50 mm	EPA Cert.Family : 7CEXL03.3ACB European Approval Number: e11*97/68JA*2004/26*0637*00
Fuel rate at rated hp/kW 74mm3/st	
S.O. 5094405	Date of Manufacture yyyy-mm-dd
Made in Japan 6271-81-2420	

Location - decals

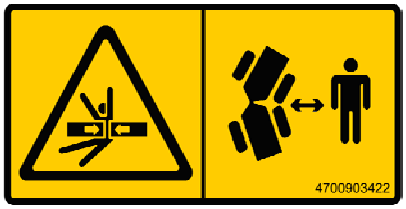




1.	Warning, crush zone	4700903422	15.	Warning, brake release	4700904895
2.	Warning, rotating engine components	4700903423	16.	Sound power level	4700791273
3.	Warning, burning hot surfaces	4700903424	17.	Battery voltage	4700393959
4.	Warning, instruction manual	4700903459	18.	Water tank	4700991657
6.	Hoisting plate	4700904870	19.	Warning, high pressure fluid	4700397286
7.	Tire pressure	4700374765	20.	Warning, starting gas	4700791642
8.	Diesel fuel	4700991658	21.	Emergency exit (cab only)	4700903590
9.	Fixing point	4700357587	22.	Warning, Edge cutter (optional)	4700904083
10.	Hydraulic fluid	4700272372	23.	Biological hydraulic fluid (optional)	4700792772
11.	Handbook compartment	4700903425	24.	Coolant	4700388449
13.	Battery disconnector	4700904835	25.	Warning, toxic gas	4700904165
14.	Fixing point	4700382751			

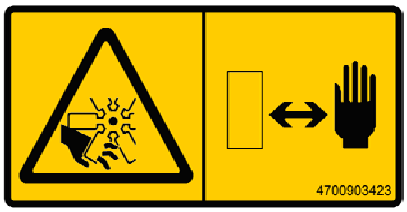
Safety decals

Always make sure that all safety decals are completely legible, and remove dirt or order new decals if they have become illegible. Use the part number specified on each decal.



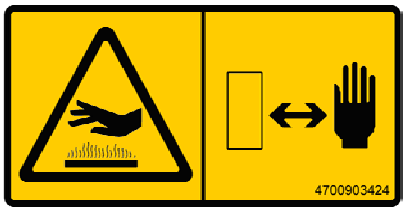
4700903422
Warning - Crush zone, wheel.

Maintain a safe distance from the crush zone.



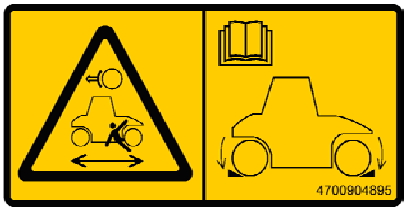
4700903423
Warning - Rotating engine components.

Keep your hands at a safe distance from the danger zone.



4700903424
Warning - Hot surfaces in the engine compartment.

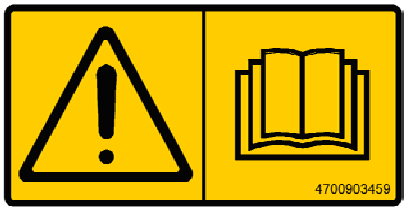
Keep your hands at a safe distance from the danger zone.



4700904895
Warning - Brake disengagement

Study the towing chapter before disengaging the brakes.

Danger of being crushed.

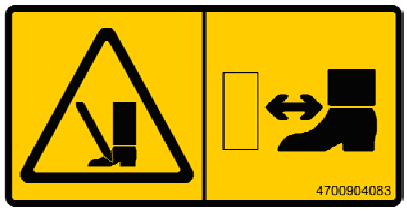


4700903459
Warning - Instruction manual

The operator must read the safety, operation and maintenance instructions before operating the machine.

4700791642
Warning - Starting gas

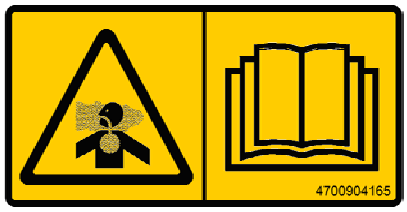
Starting gas is not to be used.



4700904083
Warning - Edge cutter (option)

Warning of rotating parts.

Maintain a safe distance from the crush zone.



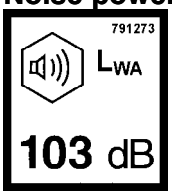
4700904165
Warning - Toxic gas (option, ACC)

Read the instruction manual.

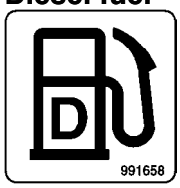
4700397286
Warning - High pressure fluid

Make sure to drain the pressure in the accumulators before opening the hydraulic system.

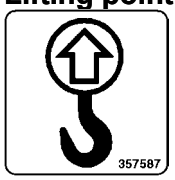
Noise power level



Diesel fuel

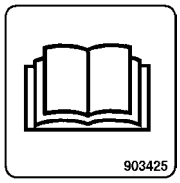


Lifting point

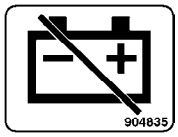


Hoisting plate

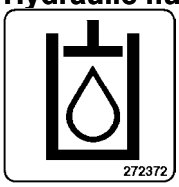
Handbook compartment



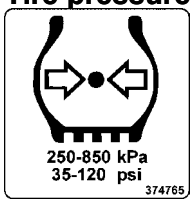
Master switch



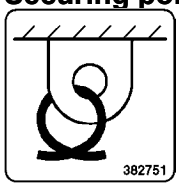
Hydraulic fluid



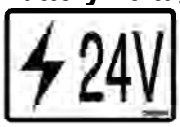
Tire pressure



Securing point



Battery voltage



Emergency exit (cab only)

Locations - Control panel and controls

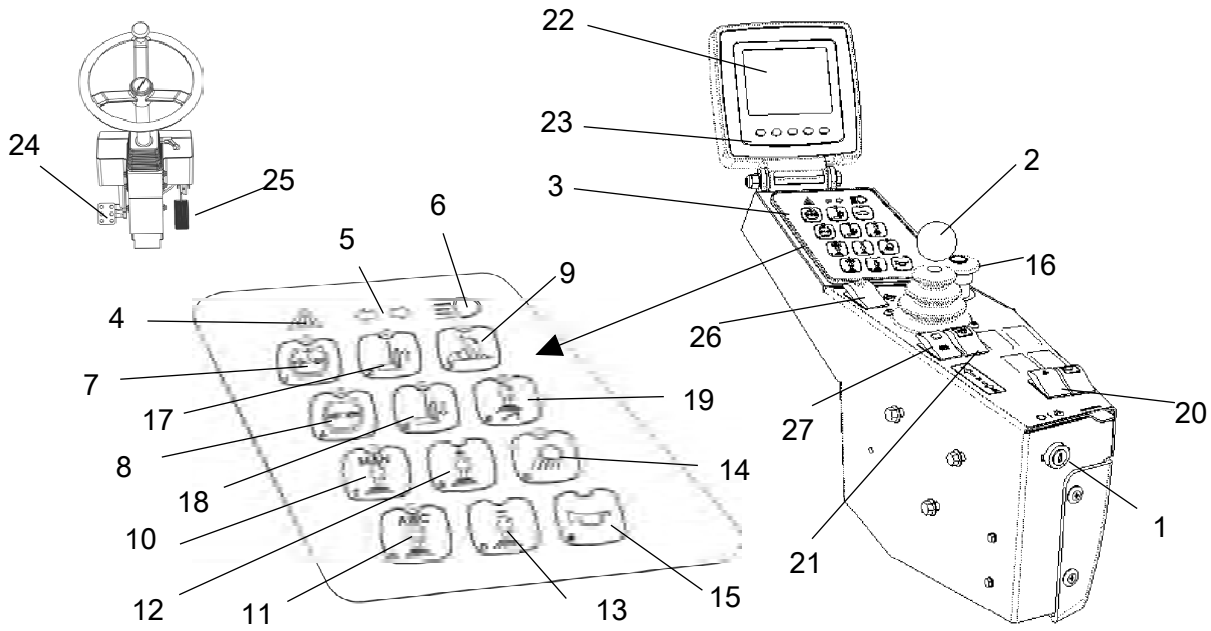
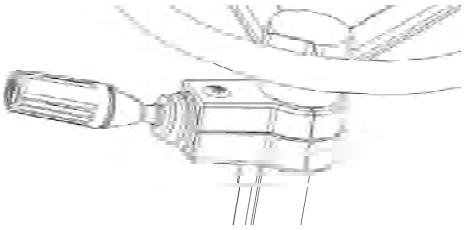


Fig. Control panel

1	Ignition switch	10	* Manual sprinkler (MAN)	17	* Edge cutter, up
2	Forward/Reverse lever	11	* Automatic sprinkler (AWC)	18	* Edge cutter, down
3	Button set	12	* Increase in watering/sprinkler interval (timer) (+)	19	* Edge cutter, sprinkling
4	Warning indicator	13	* Reduction of watering/sprinkler interval (timer) (-)	20	* Hazard warning lights
5	* Direction indicators	14	* Working lights	21	* Rotating beacon
6	* High beam indicator	15	Horn	22	Display
7	* Increase in tire pressure (+)	16	Emergency stop	23	Function buttons (5 pcs.)
8	* Decrease in tire pressure (-)			24	Brake pedal
9	Low/High speed			25	Throttle control
				26	Brake test
	* Optional			27	Parking brake



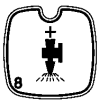
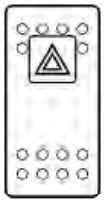
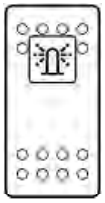
Functions

1. Direction indicators
2. Driving lights
3. Full/Dipped beam
4. Parking lights
5. Horn

Figure. Steering column switch (optional)

Function descriptions

No	Designation	Symbol	Function
1	Ignition key		The electric circuit is broken.
			All instruments and electric controls are supplied with power (Sytem control).
			Starter motor activation.
2	Forward/Reverse lever		To start the machine the lever must be in neutral position, in the middle. Move the lever forward and press the accelerator to drive forwards; move the lever back and press the accelerator to drive backwards.
3	Button set		
4	Central warning indication		General fault indicating. See the display (22) for description of the fault.
5	Direction indicators		Shows direction indicators activated (Activated via the steering column switch).
6	High beam indicator		Shows that main beam is activated. (Activated via the steering column switch.)
7	Increase in tire pressure (+)		At activation, the tire pressure increases.
8	Decrease in tire pressure (-)		At activation, the tire pressure decreases.
9	High/Low speed		The roller always starts in **High** speed mode. **Low**speed mode is obtained when activated.
			

No	Designation	Symbol	Function
10	Manual sprinkler		Gives continuous sprinkling of the wheels with water.
11	Automatic sprinkler (AWC)		When activated sprinkling is automatically switched On/Off when the forward/Reverse lever is moved out of neutral.
12	Increase in watering/sprinkler interval (timer) (+)		The sprinkling frequency increases each time you press, i.e. the volume of water for the tires.
13	Reduction of watering/sprinkler interval (timer) (-)		Each time you press this decreases the sprinkling, i.e. reduces the volume of water for the tires.
14	Working lights		By activating the working lights will turn ON.
15	Horn		Press to sound the horn.
16	Emergency stop		Brakes the roller and turns OFF the Diesel engine. All power supply will be turned OFF.
17	Edge cutter, up		When the machine is in **Low** speed mode the edge cutter can be run up or down. When the machine is in **High** speed mode the edge cutter can only be run up. When activated the edge cutter moves up.
18	Edge cutter, down		When activated the edge cutter goes down.
19	Edge cutter, sprinkling		Activate edge cutter sprinkling by depressing the switch.
20	Hazard warning lights		Activate the hazard warning light by depressing the button.
21	Rotating beacon		Activate the rotating beacon by depressing the button.
26	Brake test		Tests the brakes when activated.

No	Designation	Symbol	Function
27	Parking brake		When pressed the parking brake is activated. To release the brakes, slide the red part backwards (towards you) and change the position of the lever. **The parking brake must be activated to start the machine!**

Display explanations

Fig. Start screen

When the ignition key is activated to position I, a start screen is visible in display. This is shown for a few seconds and then switches over to the status screen.

Fig. Status screen

A status screen provides information on the fuel level, water level in the sprinkler tank, machine hours and voltage level. Fuel and water levels are specified in per cent (%).

This screen is active until the Diesel engine is started or an active screen choice is made via the function buttons below the display.

Fig. Main screen/Working screen

If the engine is started before any active screen choice is made the display will switch over to main screen.

This screen gives an overview and is kept during work:

- The speed is shown in the middle of the screen.

- High/Low speed mode is shown with a symbol in the middle of the display.

- The engine speed, asphalt temperature (Option) and tire pressure (Option) are shown in the corners.

Fig. Main screen/Working screen with menu selection buttons (1)

A menu field is shown by pressing one of the menu select buttons. The field is visible for a short while, if no selection is made the field fades out. Menu field will appear again upon pressing either one of the selection buttons (1).

Example of menu field.

	Scroll/Selection buttons to choose between available functions.
	Alarm log button to display engine and machine alarms.
	Settings/Button select menu, which opens the main menu. Settings can be changed in the main menu.
	Exit/Return button returns 1 step at once. Pressing the button (approx. 2 sec.) displays the main menu again.

Fig. Temperature screen

The temperature screen shows the temperature of the engine (top of display) and hydraulic fluid (bottom of display). The values are shown in Celsius or Fahrenheit, depending on the choice of unit system.

Fig. Asphalt temperature screen

A menu for the asphalt temperature (Option)can also be shown when an accessory asphalt temperature gauge is installed on the machine. Set the upper and lower temperature limits with the function keys.

If the actual temperature of the asphalt is outside the temperature limits, the temperature value at the top right in the working display will flash. The temperature value will be illuminated continuously as long as you stay within the required interval.

When an engine alarm is activated, the alarm is shown on the display.

The engine alarm is sent out from the engine ECM, which handles the monitoring of the engine functions.

The message, which consists of an SPN and FMI code, can be interpreted via the engine supplier error code list.

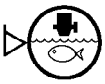
The alarm message shown is acknowledged by pressing the "OK" button on the display.

When a machine alarm is activated the alarm is shown on the display, plus a warning text that describes the alarm.

The alarm message shown is acknowledged by pressing the "OK" button on the display.

Machine alarm

Symbol	Designation	Function
	Warning symbol, hydraulic fluid filter	If the symbol is shown when the diesel engine is running at full speed, the hydraulic fluid filter must be changed.
	Warning symbol, air filter	If the symbol is shown when the engine is running at full speed, the air filter must be cleaned or replaced.
	Warning symbol, battery charging	If the symbol is shown when the engine is running, then the alternator is not charging. Stop the engine and locate the fault.

Symbol	Designation	Function
	Warning symbol, engine temperature	If this symbol is shown, the engine is too hot. Stop the engine immediately and locate the fault. Refer also to the engine manual.
	Warning symbol, hydraulic fluid temperature	This symbol is shown when the hydraulic fluid is too hot. Do not drive the roller; allow the fluid to cool by running the engine on idle, and then locate the fault.
	Warning symbol, low fuel level	This symbol is shown when the fuel level is 10%.
	Warning symbol, low sprinkler water level	This symbol is shown when the sprinkler water level is 10% in the main tank.
	Warning symbol, low braking capacity	This symbol is shown when the oil level for the brakes is low and/or if there is low brake pressure. If this alarm is shown and remains after starting the machine, or is shown during operation, stop and switch off the machine immediately and contact Service.
	Warning symbol. Error: [xx]	This symbol is shown when there is an alarm from the H1-AC unit. Error codes as per table H1-AC Alarm.

H1-AC alarm

Error code	Description	Machine Action
11	SAFE MODE: <9V or >36V LIMITED MODE: <18V or >32V	SAFE mode / LIMITED mode
13	Internal Reference Voltage	SAFE mode
14	Analog Injection Channel	SAFE mode
15	Watchdog	SAFE mode
16	Sensor Voltage Error	SAFE mode
21	Pump Forward Control Valve Error / Feedback Error	LIMITED mode
22	Pump Reverse Control Valve Error / Feedback Error	LIMITED mode
25	Digital Outputs A1 / A2	SAFE mode
26	Digital Outputs B1 / B2	SAFE mode
28	Motor Control Valve Error / Feedback Error	LIMITED mode
30	Motor Brake Pressure Defeat Valve / Feedback Error	LIMITED mode
31	Pump / Engine Speed RPM	LIMITED mode
35	FNR Error	SAFE mode
39	Inch Sensor Error	LIMITED mode
40	Inch Sensor not calibrated	Start Protection ON
43	Driving Sensor Error	LIMITED mode
47	Mode Switch-B Error	LIMITED mode
58	Motor RPM Error	LIMITED mode
59	Motor Direction Error	LIMITED mode
70	CAN Hardware Error	LIMITED mode
72	CAN RX Message timeout	LIMITED mode
98	CAN Shared Engine Control	SAFE mode

LIMITED mode

Limits the speed to 50% of max. speed.
This mode continues during the duration of the fault.

SAFE mode

The machine stops and cannot be operated before the fault has been corrected.

Alarms received are saved/logged and can be seen by selecting Display alarms.

Selection of Display alarms.

"ENGINE ALARM"

Saved/Logged engine alarms.

"MACHINE ALARM"

Saved/Logged machine alarms. These alarms come from the other systems on the machine.

"MAIN MENU"

In the main menu it is also possible to change some user and machine settings, access the service menu for calibration purposes (special service personnel only, requires pin code), and to see the version of installed software.

"USER SETTINGS"

Users can change the light settings, choose between the Metric or Imperial system, and set warning sounds On/Off.

Adjustment of the light and contrast settings on the display, including brightness of the panel light.

Operator help when starting

When trying to start the machine without having set one, two or three of the conditions required to start machine, the missing conditions are shown in the display.

The missing conditions must be set before it is possible to start the machine.

Conditions that must be set:

- Activated P-brake

- Selector lever in neutral

- Speed selector for diesel engine in low (Low = idling) (not all models)

Operator help Workmode

When attempting to activate

- Edge cutter (Option)

with the machine in High speed mode the display will show "Low speed mode" for a few seconds.

To activate the above function it is necessary to make sure that the machine's Low speed mode is activated.

Instruments and controls, cab

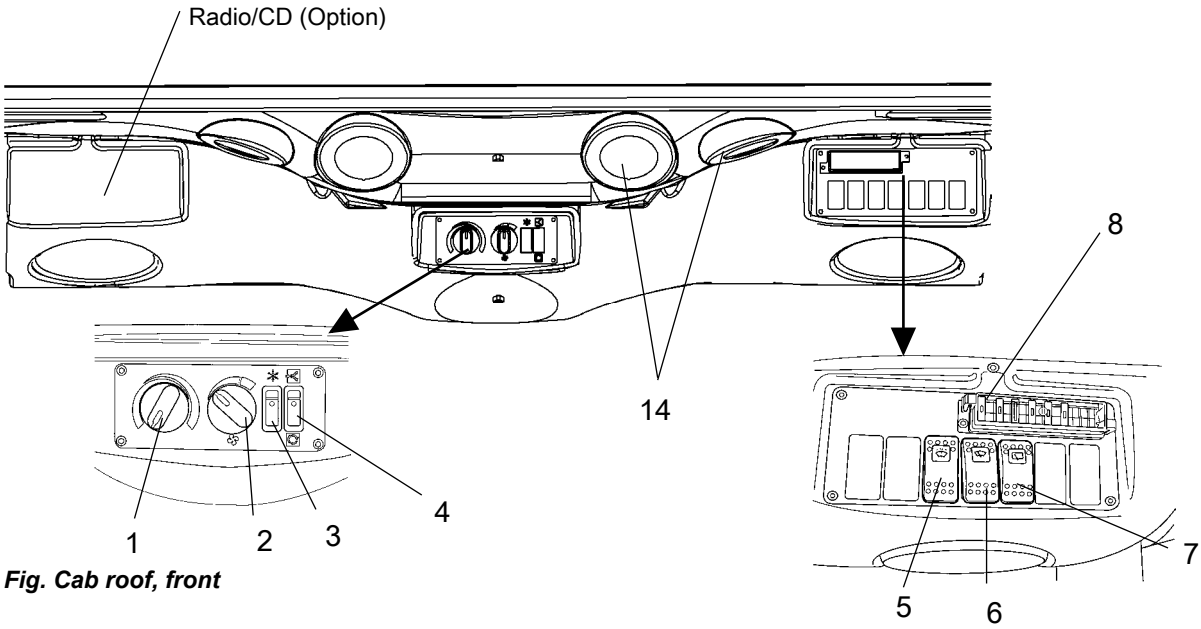


Fig. Cab roof, front

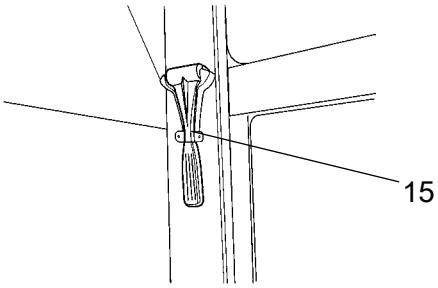
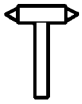


Fig. Rear right cab post

Function description of instruments and controls in the cab

No	Designation	Symbol	Function
1	Heater control		Turn to the right to increase heating. Turn to the left to reduce heating.
2	Ventilation fan, switch		In the left position, the fan is off. Turning the knob to the right increases the volume of air entering the cab.
3	Air conditioning, switch		Starts and stops the air conditioning.
4	Cab air recirculation, switch		Pressing the top opens the air damper so that fresh air comes into the cab. Pressing the bottom closes the damper so that the air recirculates inside the cab.
5	Front wiper, switch		Press to operate the front screen wiper.
6	Front and rear window screen washers, switch		Press the upper edge to activate the front screen washers. Press the lower edge to activate the rear screen washers.
7	Rear wiper, switch		Press to operate the rear screen wiper.
8	Fuse box		Contains fuses for the electrical system in the cab.
14	Defroster nozzle		Turn the nozzle to direct the flow of air.
15	Hammer for emergency exit		To escape from the cab in an emergency, release the hammer and break the opening windows on the right-hand side.

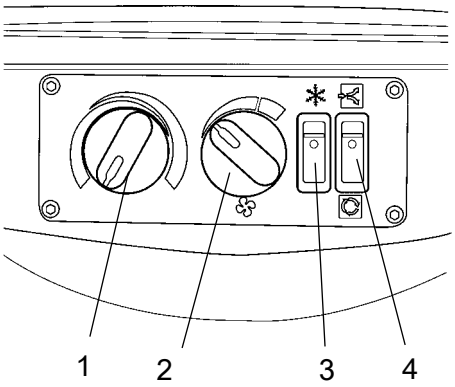
Using the cab controls.

Defroster

To quickly remove ice or mist, make sure that only the front and rear air nozzles are open.

Turn the heater and fan dial (1 and 2) to max.

Adjust the nozzle so that it blows on the window to be de-iced, or to remove mist.



Heat

If the cab is cold, open the lower nozzle on the front columns and the middle nozzles just over the controls for the heater and fan.

Turn to max heat and max fan speed.

When the required temperature has been reached, open the other nozzles and if necessary turn down the heat and fan speed.

AC/ACC

NOTE: When using AC/ACC all the windows must be closed for the system to work efficiently.

To quickly reduce the temperature in the cab, adjust the following settings on the control panel.

Turn on AC/ACC (3) and set the fresh air (4) in the lower position to switch off the fresh air valve.

Set the heater control (1) to minimum and turn up the fan speed (2). Keep only the front middle nozzles in the ceiling open.

When the temperature has dropped to a comfortable level, adjust the required temperature on the heater control (1) and reduce the fan speed (2).

Now open the remaining nozzles in the roof to achieve a comfortable temperature in the cab.

Reset the fresh air button (4) to the upper position for fresh air.

Electrical system

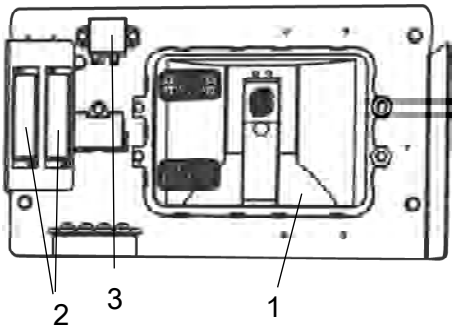


Fig. Main switchbox
1. Control unit (ECU)
2. Fuses
3. Main relay

The machine's main switchbox (1) is located on the rear of the operator platform. There is a plastic cover over the switchbox and fuses.

On the plastic cover there is a 24V socket.

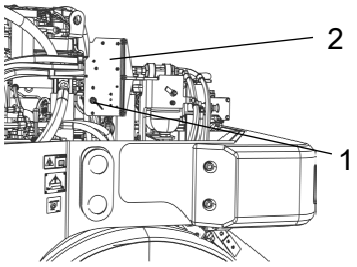


Fig. Battery bay
1. Master switch
2. Main fuse panel

The fuses in the engine compartment are located alongside the master switch.

The roller is equipped with 24 V electrical system and an AC alternator.

Connect the correct polarities (ground) to the battery. The cable between the battery and the alternator must not be disconnected when the engine is running.

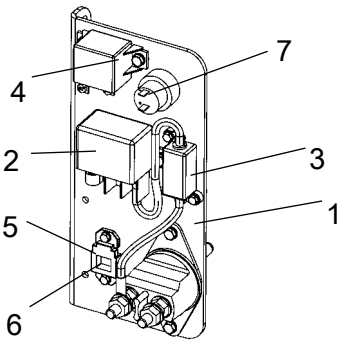


Fig. Main fuse panel
1. Battery disconnector
2. Preheating relay (120A)
3. Fuse (F20)
4. Starter relay (50A)
5.Fuses (F13, F10, F11)
6. Fuse (F5)
7. 24V socket

The main fuse panel is placed behind the battery disconnector, on the left side under the hood.

F13	Engine ECU	(30A)
F10	Main fuse	(50A)
F11	Cab	(50A)
F20	Preheater unit	(125A)
F5	Cab / CD / Radio	(10A)

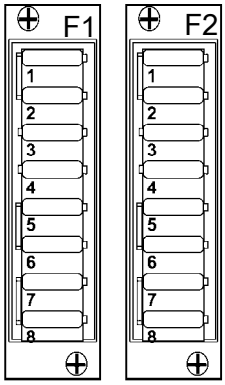


Fig. Fuse boxes.

Fuses

The figure shows the position of the fuses.

The table below gives fuse amperage and function. All fuses are flat pin fuses.

	Fuse box F1				
1.	Starter key, Main relay	5A	5.	Master ECU PWR 3	20A
2.	Master ECU, I/O Unit, Display unit	5A	6.	Master ECU PWR 4	20A
3.	Master ECU PWR 1	10A	7.	Power outlet, 24 VDC	10A
4.	Master ECU PWR 2, options	10A	8.	Power train, ECU	10A

	Fuse box F2				
1.	Air on the run	5A	5.	Reserve	
2.	DCA, asphalt	10A	6.	Reserve	
3.	Reserve		7.	Driving lights	7.5A
4.	Reserve		8.	Driving lights	20A

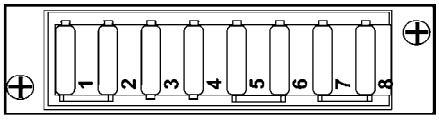


Fig. Cab roof fuse box

Fuses in cab

The figure shows the position of the fuses.

The table below gives fuse amperage and function. All fuses are flat pin fuses.

	Fuse box F7				
1.	Interior lighting	10A	4.	Heater fan	15A
2.	CD/Radio	10A	5.	Windscreen wiper/washers, front/rear	10A
3.	AC Condensor unit	15A	6.	Windscreen wiper/Washer, right side	10A

Operation

Before starting

Master switch - Switching on

Remember to carry out daily maintenance. Refer to the maintenance instructions.

The battery disconector is located in the left, rear part of engine compartment. Turn the key (1) to the On position. The roller is now supplied with power.

If the main battery/master switch is covered, the engine hood must be unlocked during operation, to be able to reach the switch in an emergency.

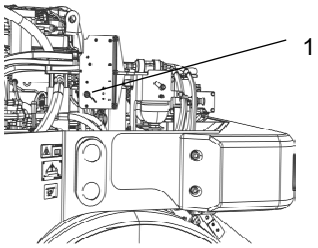


Fig. Engine compartment
1. Battery disconnector

Control panel, adjustments

The control unit has three adjustment options, transverse travel, rotation and steering column angle.

For transverse travel, raise the inner lever (1), which releases the catch.

For rotation, pull up the outer lever (2).
Make sure the control unit locks in position before operating the machine.

Release locking lever (3) to adjust the steering column. Lock in the new position.

To adjust the operator's seat, see the section for basic/comfort seat.

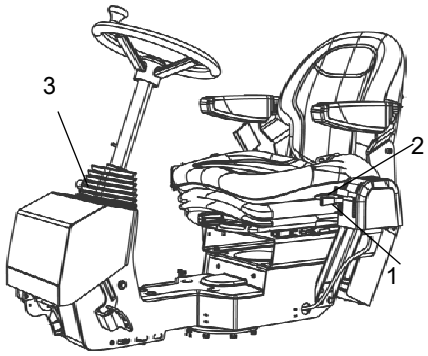


Fig. Operator position
1. Locking lever - transverse travel
2. Locking lever - rotation
3. Locking lever - steering column angle

Adjust all settings when the machine is stationary.

Always ensure that the seat is in locked position before operating the roller.

Never release the lock for side travel if the machine is standing sideways on a slope.

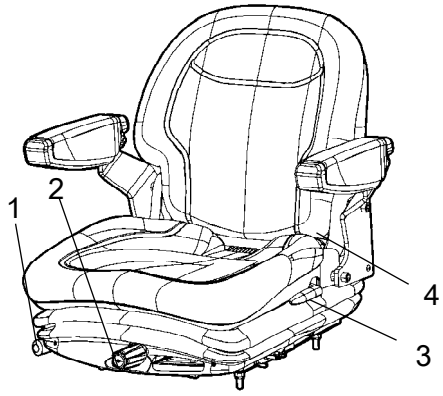


Fig. Driver seat
1. Locking lever - Length adjustment
2. Weight adjustment
3. Backrest angle
4. Seat belt

Driver seat - Adjustment

Adjust the operator's seat so that the position is comfortable and so that the controls are within easy reach.

The seat can be adjusted as follows.

- Length adjustment (1)
- Weight adjustment (2)
- Back support angle (3)

Always make sure that the seat is secure before beginning operation.

Do not forget to use the seatbelt (4).

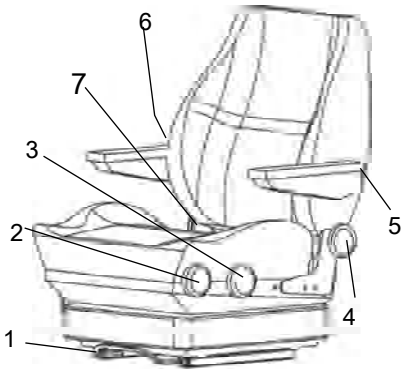


Fig. Operator's seat
1. Lever - length adjustment
2. Wheel - height adjustment
3. Wheel - seat cushion inclination
4. Wheel - backrest inclination
5. Wheel - armrest inclination
6. Wheel - lumbar support adjustment
7. Seat belt

Operator's seat, comfort (Optional) - Adjustments

Adjust the operator's seat so that the position is comfortable and so that the controls are within easy reach.

The seat can be adjusted as follows:
- Length adjustment (1)
- Height adjustment (2)
- Seat-cushion inclination (3)
- Backrest inclination (4)
- Armrest inclination (5)
- Lumbar support adjustment (6)

Always ensure that the seat is locked in position before operating the roller.

Remember to use the seat belt (7).

Display - Control

Sit down for all operations.

Turn the ignition key (1) to position I, the start screen will be shown in display.

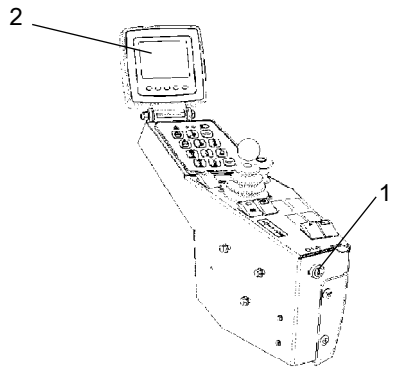


Fig. Control panel
1. Ignition key
2. Status screen

Fig. Status screen
3. Fuel level
4. Water level
5. Hour meter
6. Voltmeter

Check that the voltmeter (6) shows at least 24 volts and the levels for fuel (3) and water (4) indicates a percentage value.

The hourmeter (5) registers and shows the total number of hours the engine has run.

View

Before starting, make sure that the view ahead, to the rear, and to the sides is unobstructed.

All cab windows should be clean and the rear view mirrors should be correctly adjusted.

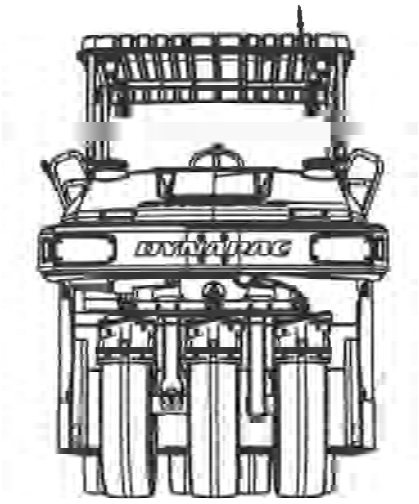


Fig. View

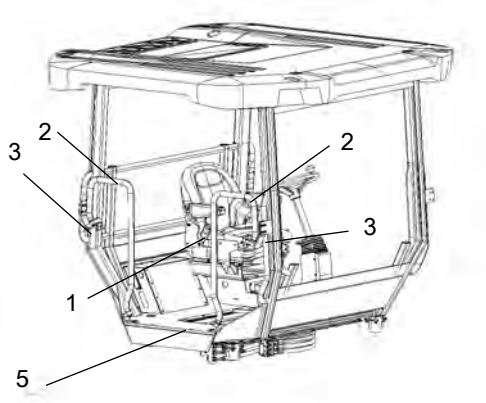


Fig. Driver seat
1. Seat belt
2. Safety rails
3. Locking knob
4. Anti-slip

Operator position

If a ROPS (Roll Over Protective Structure) or a cab is fitted to the roller, always wear the seat belt (1) provided and wear a protective helmet.

Replace the seat belt (1) if it shows signs of wear or has been subjected to high levels of force.

The safety railings (2) around the operator station are adjustable, and can be set in the inner and the outer positions. Retract the railings when driving close to walls or other obstacles.

Release the locking knob (3), set the the railings in the required position and relock in position.

Make sure that the anti-slip (4) on the platform is in good condition. Replace if the friction is poor.

If the machine is fitted with a cab, make sure that the door is closed when in motion.

Interlock

The roller is equipped with Interlock.

The diesel engine switches off after 4 seconds if the operator rises from the seat when going forwards/backwards.

If the Forward/reverse lever is in neutral when the operator stands up a buzzer will be activated until the Forward/Reverse lever is moved to the parking position.

The engine does not stop if the parking brake is activated.

The engine will switch off immediately if for any reason the Forward/Reverse lever is moved out of neutral when the operator is not sitting down in the seat.

Sit down for all operations!

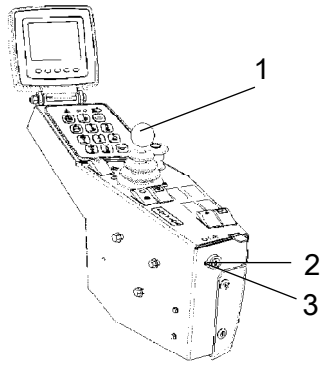


Fig. Control panel
1. Forward/Reverse lever
2. Ignition lock
3. Ignition key

Starting

Starting the engine

Make sure that the emergency stop is not activated (upper position), and that the Forward/Reverse lever is in the neutral position.
Also make sure that the parking brake is activated.

The diesel engine cannot be started in any other position of the control.

Sit down in the driver seat and turn the ignition key (3) to the right to the first position (allow the start image to change to the status image) and then to the start position. Release as soon as the engine starts.

Do not run the starter motor for too long (max. 30 seconds). If the engine will not start, wait a minute before trying again.

Let the engine idle for a few minutes to warm up, longer if the ambient temperature is below +10°C (50°F).

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Parking brake - Check

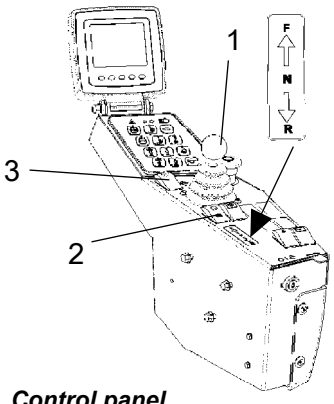


Fig. Control panel
1. Forward/Reverse lever
2. Parking brake
3. Brake test

The parking brake must be activated to start the machine!

With the engine idling and the parking brake activated, move the Forward/Reverse lever forward to position **F**. Press the brake test button **and keep it pressed** while increasing the engine speed with the accelerator. The machine should not move.
Driving with an activated parking brake only takes place when the brake test button is pressed. The brake test can also be done in reverse **R**.

Figure. Display - Status image

Check during warming up of the engine that fuel and water levels are shown correctly and that the voltage is at least 24V.

When starting and driving a machine that is cold, remember that the hydraulic fluid is also cold and that braking distances can be longer than normal until the machine reaches the working temperature.

The machine always starts in the **High speed** position.

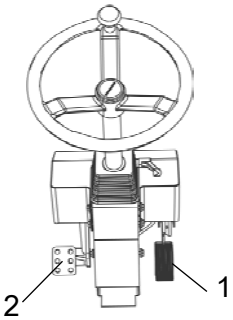


Fig. Pedals
1. Throttle control
2. Brake pedal

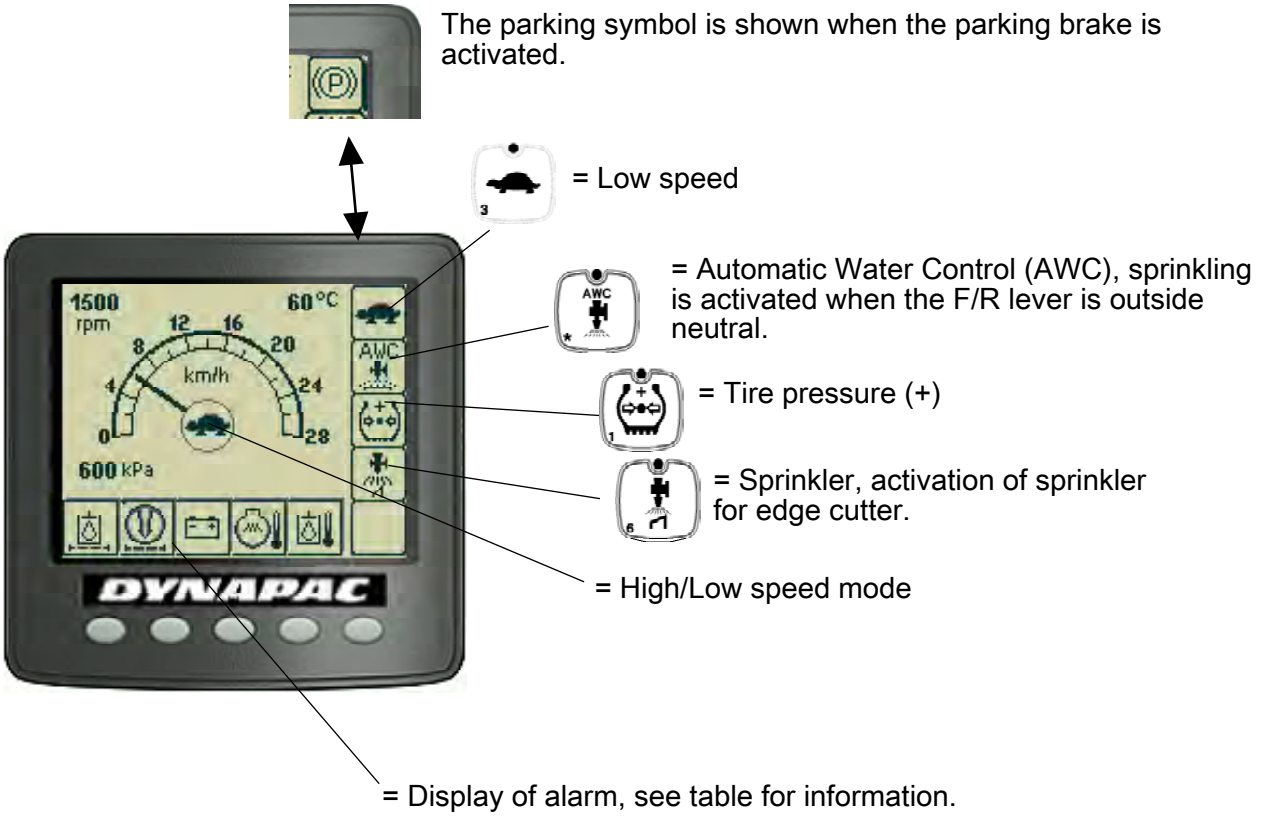
Throttle control and brake pedal.

Position the seat so that the throttle control (1) and brake pedal (2) can easily be reached, and so that the driving position is comfortable.

The direction of travel is selected, either fowards or backwards, with the Forward/Reverse lever. The speed positions **High** and **Low** produce different maximum speeds and different starting and stopping ramps. Softer start/stop in **Low** speed position and harder start/stop in **High** speed position. Increase or decrease the roller speed within the area with the accelerator (1).

Check the main brake. It is very important to make sure that the brakes are working properly. Run the machine slowly forward, and press the brake pedal to confirm the function.

Display when activating choice via the button set.



Alarm descriptions

Symbol	Designation	Function
	Warning lamp, hydraulic filter	If the lamp comes on while the engine is running at full speed, the hydraulic filter must be changed.
	Warning lamp, air filter	If the lamp comes on while the engine is running at full speed, the air filter must be cleaned or replaced.
	Warning lamp, battery charging	If the lamp comes on while the engine is running, the alternator is not charging. Stop the engine and locate the fault.
	Warning light, engine temperature	If the lamp comes on, the engine is too hot. Stop the engine immediately and locate the fault. Refer also to the engine manual.
	Warning lamp, hydraulic fluid temperature	If the lamp comes on, the hydraulic fluid is too hot. Do not drive the roller. Cool the fluid by allowing the engine to idle and locate the fault.

Operating the roller

Under no circumstances is the machine to be operated from the ground. The operator must be seated inside the machine during all operation.

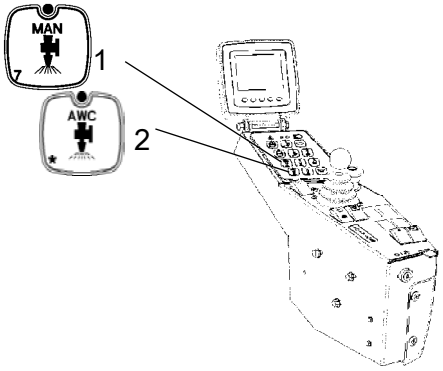


Fig. Control panel
1. Manual sprinkling
2. Automatic sprinkling

Activate the operating speed with the accelerator, placed on the right side of the steering column.

Check that the steering is working correctly by turning the steering wheel once to the right and once to the left while the roller is stationary.

When compacting asphalt, remember to turn on the sprinkler system (1) or (2).

Make sure that the area in front of and behind the roller is clear.

Release the parking brake button (1) by sliding the red lock on the button backwards and changing the postion of the lever. Remember that the roller can start rolling, if it is on a slope.

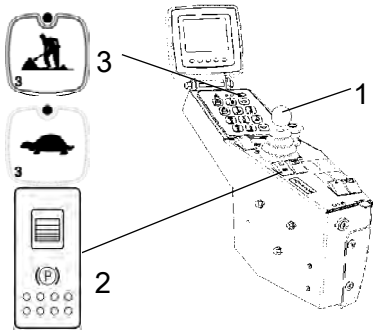


Fig. Control panel
1. Forward/Reverse lever
2. Parking brake control
3. Low speed

Activate the button for low speed (3).

Move the Forward/Reverse lever (1) forwards or backwards, depending on which direction of travel is required.

Increase or decrease the roller speed by using the throttle control.

Check the function of the parking brake by activating the parking brake and mowing the Forward/Reverse lever to position F or R. Keep the brake test button pressed in. When you press the throttle control the machine should not move.

Operating on a slope

Under no circumstances is the machine to be operated from the ground. The operator must be seated inside the machine during all operation.

When transporting on steep ground (downward slope > 5%) make sure not to exceed the maximum speed for the roller.

Take your foot off the accelerator and brake with the engine. Use the main brake as well if the speed continues to increase.

Selecting low speed increases the efficiency of the engine brake and prolongs the brake life.

Low speed should **always** be selected when working and transporting on steep slopes (>15%).

The driving and braking rear wheels should also **always** be pointing down the slope, i.e. the roller is driven forwards up the slope and reversed down the slope.

Make sure that the area in front of and behind the roller is clear.

Checking the treads on the tires

Inspect the tire treads from time to time to ensure no asphalt has stuck to the tires. This can occur before the tires are sufficiently warm. Mixing 2-4% cutting fluid to the tire sprinkler water can prevent this problem.

Edge cutting (Optional)

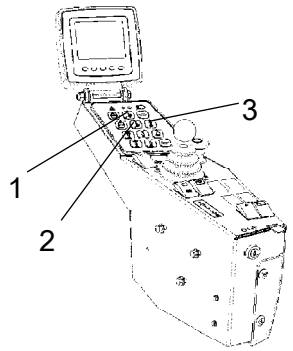


Fig. Switch
1. Edge cutter, Up
2. Edge cutter, Down
3. Sprinkler, edge cutter

The machine must be in the **Low speed** position to active the edge cutter.

With the machine in the **Low speed** position , and if the button (1) on the panel is pressed, this will lower the edge cutter to the surface of the asphalt by means of a hydraulic cylinder. To reset the edge cutter in its original position, press the button (2) on the panel to lift the edge cutter.

The tool can also be lifted if the machine is in transport position.

A bypass valve prevents the hydraulic system being overloaded.

There is a separate sprinkler system which the

operator should use to avoid asphalt sticking to the edge cutter. The system is operated with a switch (3). The water is drawn from the main water tank, which is also used for the normal sprinkler system.

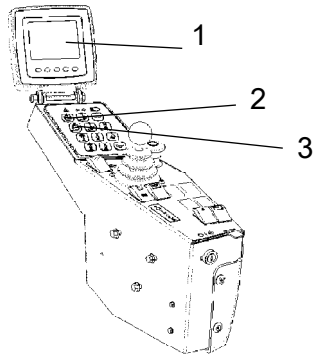


Fig. Keypad
1. Display
2. Tire pressure (+)
3. Tire pressure (-)

Variable tire pressure (air-on-the-run) (Option)

The operator can vary the pressure while work is in progress with the air pressure control on the roller. The pressure can be variably adjusted with the keys (2) and (3) on the keypad within the interval 240 kPa to 830 kPa (35 to 120 psi). The tire pressure is increased with the (2) key, and reduced with the (3) key. The pressure level in the tires is shown in the bottom left corner on the display.

When the tire pressure is at maximum level (830 kPa), or minimum level (240 kPa), it is not possible to increase/lower the pressure.

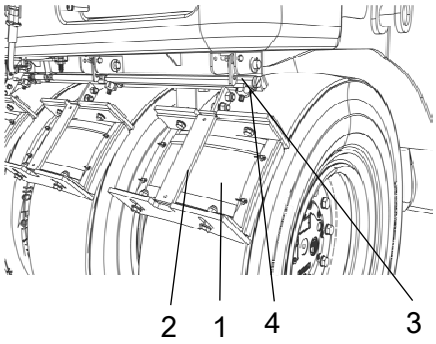


Fig. Coconut mats
1. Coconut mat
2. Scraper holder
3. Locking hook
4. Lock pin

Coconut mats (Option)

To apply cocunut mats on the wheels:

- Grip the handle in the middle of the scraper holder (2), and lift.

- Make sure that the lock pin (4) releases properly from the locking hook (3) and allow the scraper to rest against the tires in the working position.

To release the coconut mats:

- Grip the handle in the middle of the scraper holder (2), and lift.

- Make sure that the lock pin (4) hooks secure in the locking hook (3).

Ballast box

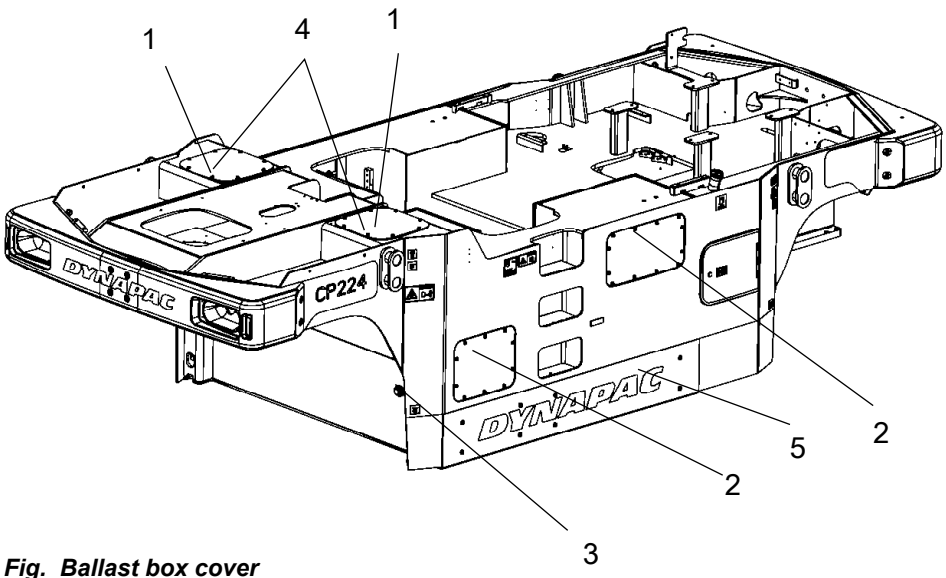


Fig. Ballast box cover
1. Top cover
2. Side cover
3. Plug (water draining)
4. Cover for ballast water
5. Side panel for steel ballast weights

Fill the box from above.

Remove the top cover (1), or fill with ballast water via the screw on the cover (4).

Leave the side cover (2) on, so that sand and water does not run out.

Do not remove the plug (3) because the water will run out when the ballast is supplemented with water.

Top up the ballast box when necessary with gravel, sand and steel.

Water can be added when filling with sand, which spreads out the sand and fills out the spaces between the ballast.

When using the roller with mixed ballast, start with the available steel objects and then add the requisite amount of sand and water.

Distribute the ballast evenly.

When sand is filled in the ballast section it should be moistened with water. This causes the sand to be spread evenly.

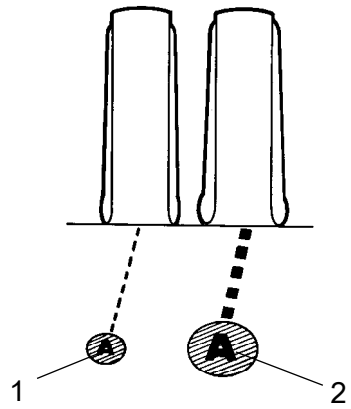


Fig. Ground contact surface
1. Contact surface at high tire pressure
2. Contact surface at low tire pressure

Driving (Ground Pressure)

Ground pressure

The contact surface of the tire can be changed by means of tire pressure.

High tire pressure gives a smaller contact surface (1).

Low tire pressure gives a larger contact surface (2).

The total service weight divided by the number of tires give the pressure per wheel. See Table.

The ground contact surface of the tire is relevant for the compaction result.

Ground pressure

Wheel pressure, kg			Tire pressure, kPa			
	240	350	480	620	720	830
			GROUND PRESSURE, kPa			
1125	200	240	270	300	330	340
1375	220	260	300	330	350	380
1825	240	280	340	380	400	430
2250	250	310	360	410	440	480
2750	260	320	390	440	480	520
3000	270	330	410	460	490	540

Wheel pressure, lbs			Tire pressure, psi			
	35	50	70	90	105	120
			GROUND PRESSURE, psi			
2500	29	35	39	44	47	49
3000	31	38	44	48	51	55
4000	35	41	49	55	58	62
5000	37	45	52	60	64	69
6000	38	47	57	64	70	75
6500	39	48	59	66	71	78

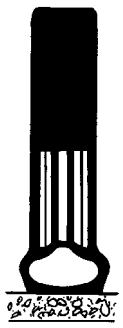


Fig. Low ground pressure, larger area

Low tire pressure - 240 kPa (34.8 psi).

The lower the tire pressure, the lower the pressure on the contact surface due to larger contact surface.

Is used on lots of loose material.

Fig. Normal ground pressure

Normal tire pressure - 480 kPa (69.6 psi)

Used for degradation session.

Fig. High ground pressure, smaller area

High tire pressure - 830 kPa (120.4 psi).

The higher the tire pressure, the greater the pressure on the contact surface due to smaller contact surface.

Used for thick layers and finishing sessions.

Interlock/Emergency stop/Parking brake - Check

The interlock, emergency stop and parking brake must be checked daily before operating. A function check of the interlock and emergency stop requires a restart.

The interlock function is checked by the operator standing up from the seat when the roller is moving very slowly forwards/backwards. (Check in both directions). Hold the steering wheel firmly and brace yourself for a sudden stop. A buzzer goes on and after 4 seconds the engine switches off and the brakes are activated.

Check the function of the emergency stop by pressing the emergency stop when the roller is moving slowly forwards/backwards. (Check in both directions). Hold the steering wheel firmly and brace yourself for a sudden stop. The engine switches off and the brakes are activated.

Check the function of the parking brake by activating the parking brake when the roller is moving very slowly forwards/backwards. (Check in both directions). Hold the steering wheel and brace yourself for a sudden stop when the brakes are activated. The engine does not switch off.

Normal braking

Release the throttle control (1) and press the brake pedal (2).

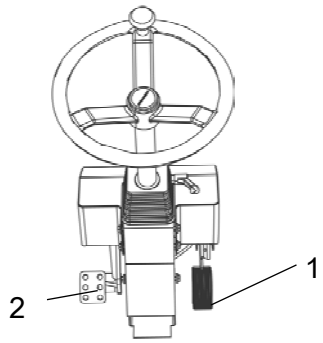


Fig. Control panel
1. Throttle control
2. Brake pedal

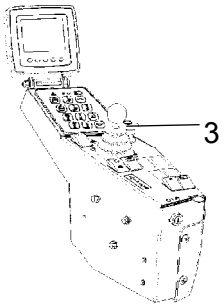


Fig. Control panel
3. Emergency stop

Emergency braking

The brake pedal is normally used to brake.

For emergency braking, press the emergency stop (3), hold the steering wheel firmly and be prepared for a sudden stop. The engine stops.

The Diesel engine will stop and must be restarted.

When starting after emergency braking, the Forward/Reverse lever must be in the "N" position, and the parking brake has to be activated.

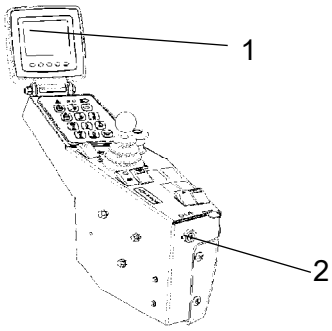


Fig. Control panel
1. Display
2. Ignition key

Switching off

Allow the engine to low idle for a few minutes to cool down.

Check the display to see if any faults are indicated. Switch off all lights and other electrical functions.

Push in the parking brake switch.

Turn the ignition switch (1) to the left to the shut off position.

Fit the instrument cover on the display and top of the control box (on rollers without cab), and lock it.

Chocking the wheels

Never leave the roller when the engine is running, unless the parking brake is activated.

Make sure that the roller is parked in a safe area, free from traffic. Chock the wheels if the roller is parked on sloping ground.

Keep in mind that there is a risk of freezing during the winter. Drain the water tanks and water lines.

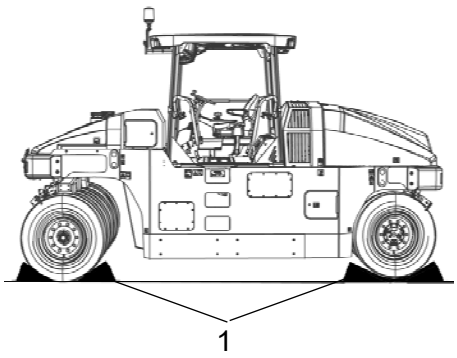


Fig. Chocking the wheels
1. Chocks

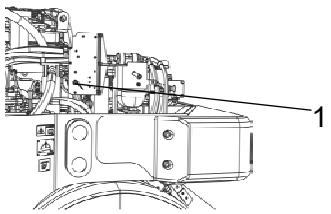


Fig. Engine compartment
1. Battery disconnector

Master switch

Before leaving the roller for the day, switch the master switch (1) to the disconnected position and remove the handle.

This will prevent battery discharging and will also make it difficult for unauthorized persons to start and operate the machine. Lock the service doors/covers.

Long-term parking

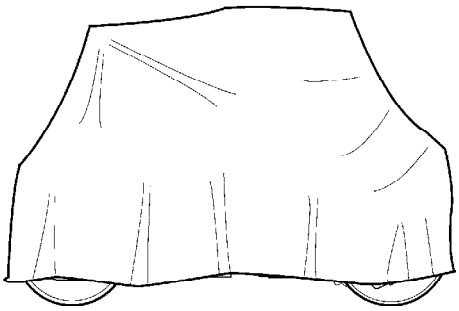


Fig. Roller weather protection

The following instructions should be followed when long term parking (more than one month).

These measures apply when parking for a period of up to 6 months.

Before re-commissioning the roller, the points marked with an asterisk * must be returned to the pre-storage state.

Wash the machine and touch up the paint finish to avoid rusting.

Treat exposed parts with anti-rust agent, lubricate the machine thoroughly and apply grease to unpainted surfaces.

Engine

* Refer to the manufacturer’s instructions in the engine manual that is supplied with the roller.

Battery

* Remove the battery/battteries from the machine, clean the outside and trickle charge once a month.

Air cleaner, exhaust pipe

* Cover the air cleaner (see under the heading 'Every 50 hours of operation' or 'Every 1000 hours of operation') or its opening with plastic or tape. Also cover the exhaust pipe opening. This is to avoid moisture entering the engine.

Watering system

* Empty the water tank and all hoses of water. Empty the filter housing and the water pump. Undo all sprinkler nozzles.

See maintenance sections for "Watering system - draining".

Fuel tank

Fill the fuel tank completely full to prevent condensation.

Hydraulic reservoir

Fill the hydraulic reservoir to the uppermost level mark (see under the heading ‘Every 10 hours of operation.’)

Tires

Make sure that tire pressures are at least 200 kPa (29 psi).

Steering cylinder, hinges, etc.

Grease the steering cylinder piston with conservation grease.

Grease the hinges on the doors to the engine compartment and the cab.

Hoods, tarpaulin

* Lower the instrument cover over the instrument panel.

* Cover the entire roller with a tarpaulin. A gap must be left between the tarpaulin and the ground.

* If possible, store the roller indoors and ideally in a building where the temperature is constant.

Miscellaneous

Lifting

Weight: refer to the hoisting plate on the roller

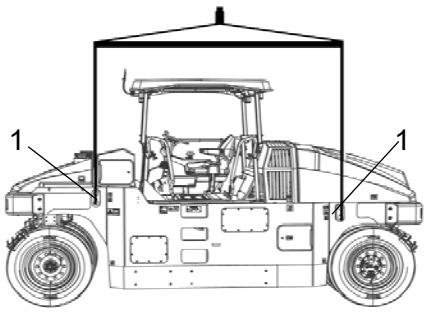


Fig. Roller prepared for lifting
1. Hoisting plate

Lifting the roller

Ensure that the front wheels are parallel with the frame before the roller is lifted.

Place the lifting chains in the lifting eyes and make sure that no parts are damaged by the chains when lifting.

The machine's gross weight is specified on the hoisting plate (1). Refer also to the Technical specifications.

Lifting equipment such as chains, steel wires, straps and lifting hooks must be dimensioned in accordance with the relevant safety regulations for the lifting equipment.

Stand well clear of the hoisted machine! Make sure that the lifting hooks are properly secured.

Weight: refer to the hoisting plate on the roller

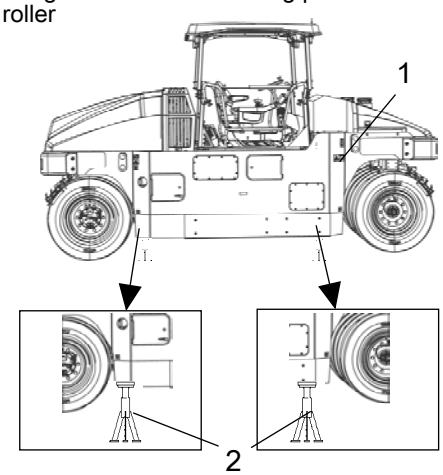


Figure. Roller lifted with jack
1. Lifting plate
2. Jack

Lifting the roller with jack:

The machine's gross weight is specified on the hoisting plate (1). Refer also to the Technical specifications.

The lifting device such as a jack (2), or equivalent, must be dimensioned according to the safety regulations for lifting devices.

Do not go under a lifted load! Make sure that the lifting device is secure in its position, and on a level and stable suface.

The machine **must only be lifted** with a jack, or the like, positioned as per the markings. The frame is reinforced at these points to withstand the tension. Lifting at any other place can result in damage to the machine or personal injury.

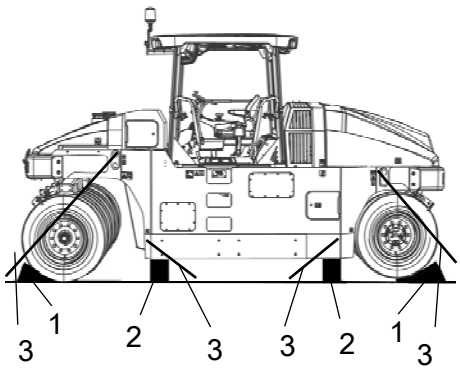


Fig. Positioning
1. Chocks
2. Blocks
3. Straps

Roller prepared for transport

Activate the parking brake.

Make sure that the machine is in a neutral position, i.e. that the front tires are pointing forwards.

Chock the tiers (1) and secure the chocks to the transport vehicle. The chock should have an angle of 37° and minimum height of 25 cm (9.9 inches). The tiers should be chocked both forwards and backwards.

Block under the frame (2) to ensure tensioned chains if the air goes out of the tires. Block up the machine as shown in figure

Secure the roller with chains in all four corners. The attachment points are shown on the decals. Place the chains in symmetrical pairs crossing each other.

Make sure that the chains, blocks and attachments in the transport vehicle are approved and have the requisite breaking strain. Check at regular intervals that the chains are not slack.

Towing/Recovering

The roller can be moved up to 300 meters (330 yards) using the instructions below.

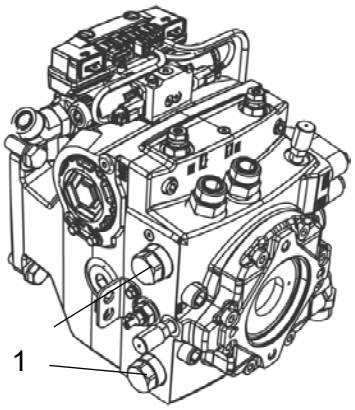


Fig. Propulsion pump
1. By-pass valves

Short distance towing with the engine running

Activate the parking brake, and temporarily stop the engine. Chock the wheels to prevent the roller from moving.

Open the hood and make sure that the propulsion pump is accessible.

On the pump there are two by-pass valves (1) (hex screws), which should be turned three turns anticlockwise to put the system in by-pass mode.

By-pass mode means that A and B sides on the pump are freely connected to the pressure side.

This function enables a machine to be moved without the drive shaft rotating.

Start the engine and allow it to idle.

Place the Forward/Reverse lever in the forward or reverse position. If the lever is in neutral, the brakes in the hydraulic motors are activated.

The roller can now be towed and can also be steered if the steering system is otherwise functioning.

To disengage the by-pass mode, turn back the by-pass valves (1) three turns clockwise.

The machine must not be moved at a speed higher than 5 km/h, and no more than 300 meters. Otherwise there is a risk of damaging the drives. Make sure to reset the towing valves (by turning them three turns clockwise) after towing.

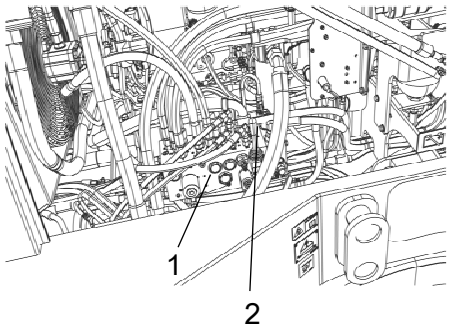


Fig. Brake release valve
1. Valve
2. Pump arm

Short distance towing when the engine is inoperative.

Chock the wheels to prevent the roller from moving when the brakes are hydraulically disengaged.

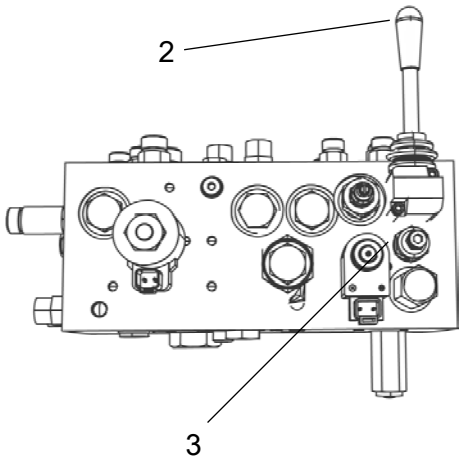


Fig. Valve block
2. Pump arm
3. Towing valve

Open the hood and make sure that the propulsion pump is accessible.

On the pump there are two by-pass valves (1) (hex screws), which should be turned three turns anticlockwise to put the system in by-pass mode.

By-pass mode means that A and B sides on the pump are freely connected to the pressure side.

This function enables a machine to be moved without the drive shaft rotating.

The release pump for the brakes is located on the left side in the engine compartment.

Pump with the arm (2) until the brakes are released.

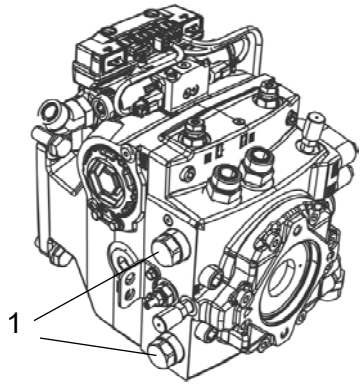


Fig. Propulsion pump
1. By-pass valve

To quickly drain the brake release pressure, start or run the engine for a few seconds with the starter.

To drain quickly when the starter is not working, screw the towing valve (3) **four** turns anticlockwise.

It is important to reset the towing valve with **four** turns clockwise.

To disengage the by-pass mode, turn back the hex screws (1) three turns clockwise.

The roller can now be towed.

The machine must not be moved at a speed higher than 5 km/h, and no more than 300 meters. Otherwise there is a risk of damaging the drives. Make sure to reset the towing valves (by turning them three turns clockwise) after towing.

Towing the roller

When towing/recovering, the roller must be braked by the towing vehicle. A towing bar must be used as the roller has no brakes.

The roller must be towed slowly, max. 5 km/h (3 mph) and only towed a short distance, max. 300 m (1,000 ft).

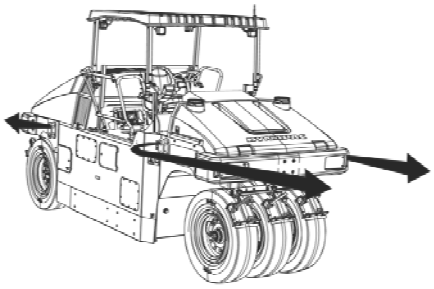


Fig. Towing

When towing/retrieving a machine, the towing device must be connected to both lifting holes in the diagram.

Pulling forces should act parallel to the machine's longitudinal axis, as illustrated. See table below for maximum permitted pulling force for machine model.

Model	kN	lbf
CP224	324	72,900

Reverse the towing preparations made to the hydraulic pump and/or the motor.

Trailer eye (Option)

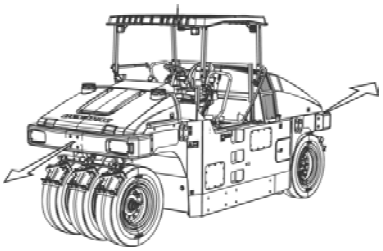


Fig. Trailer eye

The roller can be fitted with a trailer eye.

The trailer eye is not designed to be used for towing/recovery. It is only designed for towing objects weighing no more than 4,000 kg.

Operating instructions - Summary

1. **Follow the SAFETY INSTRUCTIONS specified in the Safety Manual.**

2. Make sure that all instructions in the MAINTENANCE section are followed.

3. Turn the master switch to the ON position.

4. Move the forward/reverse lever to position "P".

5. Set the Emergency stop in the pulled-out position. The machine always starts in **High**speed mode.

6. Start the engine and allow it to warm up.

7. Move the forward/reverse lever to the NEUTRAL position.

8. **Operate the roller. The Forward/Reverse lever gives the required direction of travel. Use the accelerator carefully.**

9. **Test the brakes. Remember that the braking distance will be longer if the hydraulic fluid is cold.**

10. Check that the tires are thoroughly sprinkled when this is necessary.

11. **IN AN EMERGENCY:**
    - Press the EMERGENCY STOP.
    - Hold the steering wheel firmly.
    - Brace yourself for a sudden stop.

12. When parking:
    - Move the forward/reverse lever to position "P".
    - Stop the engine and chock the wheels.

13. When lifting: - Refer to the relevant section in the Instruction Manual.

14. When towing: - Refer to the relevant section in the Instruction Manual.

15. When transporting: - Refer to the relevant section in the Instruction Manual.

16. When recovering - Refer to the relevant section in the Instruction Manual.

Preventive maintenance

Complete maintenance is necessary for the machine to function satisfactorily and at the lowest possible cost.

The Maintenance section includes the periodic maintenance that must be carried out on the machine.

The recommended maintenance intervals assume that the machine is used in a normal environment and working conditions.

Acceptance and delivery inspection

The machine is tested and adjusted before it leaves the factory.

On arrival, before delivery to the customer, delivery inspection must be conducted as per the check list in the warranty document.

Any transport damage must be immediately reported to the transport company.

Warranty

The warranty is only valid if the stiplulated delivery inspection and the separate service inspection have been completed as per the warranty document, and when the machine has been registered for starting under the warranty.

The warranty is not valid if damage has been caused by inadequate service, incorrect use of the machine, the use of lubricants and hydraulic fluids other than those specified in the manual, or if any other adjustments have been made without the requisite authorisation.

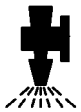
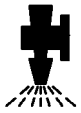
Maintenance - Lubricants and symbols

Always use high-quality lubricants and the amounts recommended. Too much grease or oil can cause overheating, resulting in rapid wear.

			DYNAPAC
ENGINE OIL	Air temperature -15°C - +50°C (5°F-122°F)	Shell Rimula R4 L 15W-40 or equivalent.	**AtlasCopco Engine 100** P/N 5580020624 (5 liters)
HYDRAULIC FLUID	Air temperature -15°C - +50°C (5°F-122°F)	Shell Tellus S2 V68 or equivalent.	**AtlasCopco Hydraulic 300** P/N 9106230330 (20 liters)
	Air temperature over +50°C (122°F)	Shell Tellus S2 V100 or equivalent.	
Bio-Hydr. BIOLOGICAL HYDRAULIC FLUID, PANOLIN	When it leaves the factory, the machine may be filled with biologically degradable fluid. The same type of fluid must be used when changing or topping up.	PANOLIN HLP Synth 46 (www.panolin.com)	
GREASE		Shell Retinax LX2 or equivalent.	**Dynapac Roller Grease** (0.4kg), P/N 4812030096
FUEL	See engine manual.	-	-
COOLANT	Anti-freeze protection down to about -37°C (-34.6°F)	GlycoShell/Carcoolant 774C or equivalent, (mixed 50/50 with water)	

Other fuel and lubricants are required when operating in areas with extremely high or extremely low ambient temperatures. See the ‘Special instructions’ chapter, or consult Dynapac.

Maintenance symbols

	Engine, oil level		Air filter
	Engine, oil filter		Battery
	Hydraulic fluid tank, level		Sprinkler
	Hydraulic fluid, filter		Sprinkler water
	Lubricating oil		Recycling
	Coolant level		Fuel filter
	Air pressure		Transmission, oil level
			Sprinkler

Maintenance - Maintenance schedule

Service and maintenance points

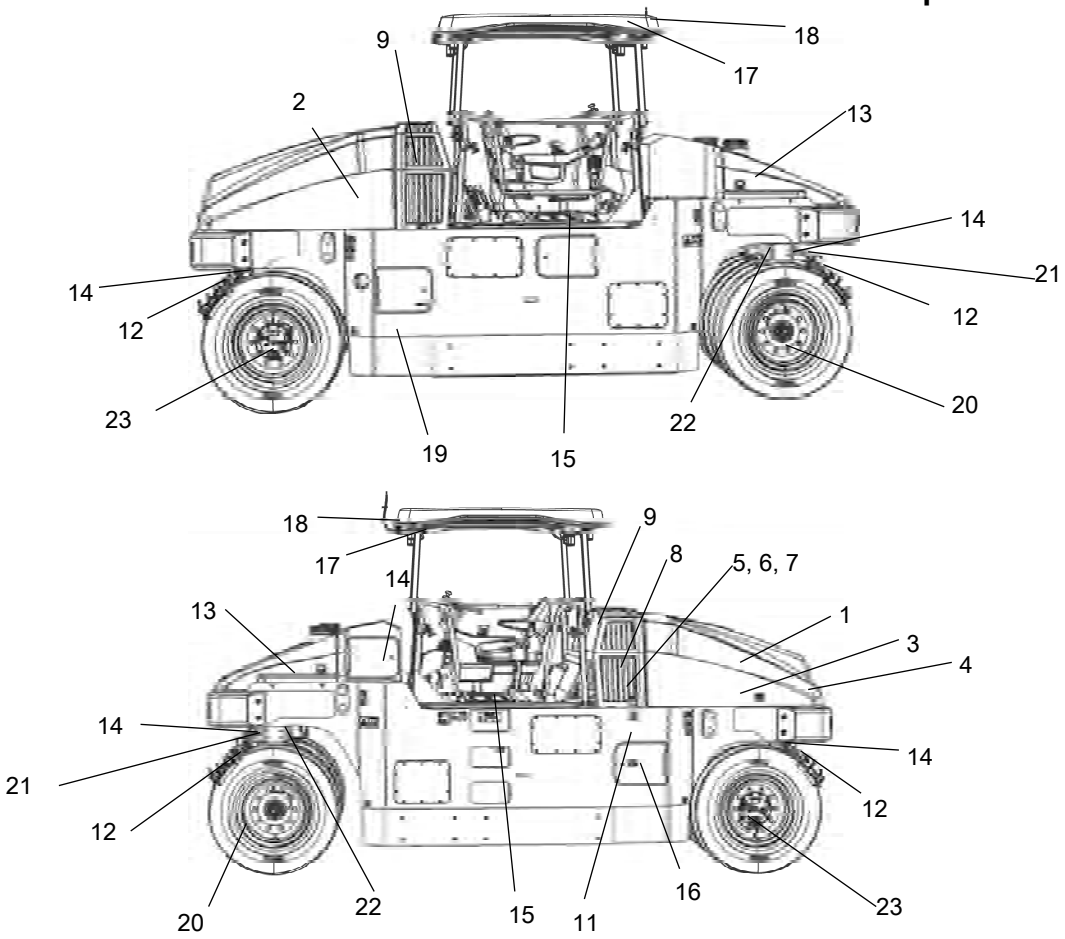


Fig. Service and maintenance points

1. Engine oil
2. Oil filter
3. Fuel filter
4. Hydraulic filter
5. Hydraulic fluid level
6. Hydraulic fluid, filling
7. Hydraulic tank cap
8. Hydraulic fluid cooler
9. Coolant
10. Air cleaner
11. Refueling
12. Scrapers
13. Water tank, filling
14. Sprinkling system
15. Seat bearing
16. Battery
17. Cab, air filter
18. Cab, AC
19. Edge cutter
20. Lower pivot bearing
21. Upper pivot bearing
22. Pivot bearing
23. Wheel gear

General

Periodic maintenance should be carried out after the number of hours specified. Use the daily, weekly etc. periods where number of hours cannot be used.

Remove all dirt before filling, when checking oils and fuel and when lubricating using oil or grease.

The manufacturer's instructions found in the engine manual also apply.

Every 10 hours of operation (Daily)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
	Before starting up for the first time on that day	
2	Check the engine oil level	Refer to the engine manual
9	Check the engine coolant level	
6	Check the hydraulic reservoir level	
11	Refuel	
13	Fill the water tanks	
14	Check the sprinkler system	
12	Check the scraper setting	

After the FIRST 50 hours of operation

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
1, 2	Change the engine oil and oil filter	Refer to the engine manual
3	Change the fuel filter	Refer to the engine manual
4	Change the hydraulic fluid filter	Refer to 1000h.
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	
23	Change the oil in the wheel gear	

Every 50 hours of operation (Weekly)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
	Check the air intake system	
	Check the tire pressure	
	Retighten the wheel nuts	
	Inspect/clean the filter element in the air cleaner	Replace as required
	Draining the fuel prefilter	
	Inspect the air conditioning	Optional
	Inspect/lubricate the edge cutter	Optional
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	

Every 250 hours of operation (Monthly)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
1,2	Change the diesel engine oil and oil filter	Refer to the engine
8	Clean the hydraulic fluid cooler/water cooler	Or when required
	Check the AC	Optional
	Check the batteries condition.	
	Grease the pilot bearings and link bearings	
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	

Every 500 hours of operation (Every three months)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
3	Change the engine fuel filter	Refer to the engine manual
3	Change the engine pre-filter	
	Check bolted joints	
7	Check the hydraulic reservoir cover/breather	
15	Grease the chair bearing	
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	
22	Lubricate pivot bearing	

Every 1000 hours of operation (Every six months)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
	Check engine valve clearances	Refer to the engine manual
	Check the engine belt drive system	Refer to the engine manual
10	Replace the air cleaner's main filter and backup filter.	
4	Change the hydraulic fluid filter	
17	Replace the air cleaner filter in the cab	
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	
23	Change the oil in the wheel gear	
23	Check the oil level in the wheel gear	

Every 2000 hours of operation (Yearly)

Refer to the contents to find the page number of the sections referred to !

Pos. in fig	Action	Comment
6	Change the hydraulic fluid	
11	Drain and clean the fuel tank	
13	Drain and clean the water tank	
	Check the condition of the pilot bearings	
	Overhaul the air conditioning	Optional
	Changing the coolant	Refer to the engine manual
20	Lubricate lower pivot bearing	
21	Lubricate upper pivot bearing	

Maintenance, 10h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Diesel engine - Check oil level

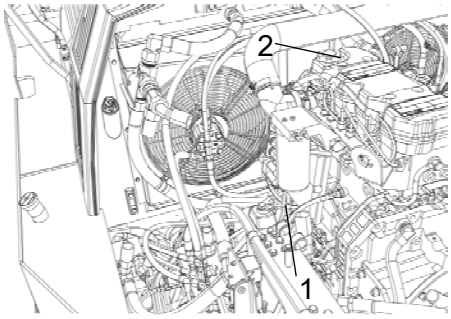


Fig. Engine compartment
1. Dipstick
2. Oil filler cap

The dip stick is accessible under the hood.

Take care not to touch any hot parts of the engine or the radiator when removing the dipstick. Risk of burns.

The dipstick is located down on the left side of the engine.

Pull out the dipstick (1) and check that the oil level is between the upper and lower marks.

For further details, refer to the engine's instruction manual.

Coolant level - Check

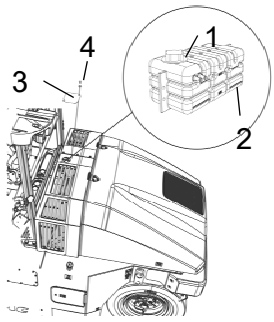


Fig. Expansion tank
1. Filler cap
2. Level marking
3. Protective plate
4. Bolt

The expansion tank is placed in the middle, between the operator platform and the engine compartment. Refilling takes place from over the black cover between the operator platform and the hood.

To access the expansion tank you have to remove the protective plate (3) via two bolts (4).

Check that the coolant level is between the max. and min. marks (2).

Observe great caution if the cap has to be opened while the engine is hot. Wear protective gloves and goggles.

Fill with a mixture of 50% water and 50% anti freeze. See the lubrication specification in these instructions and the engine manual.

Flush the system every other year and change the coolant. Also check that the air has unobstructed passage through the reservoir.

Brake fluid level - Check

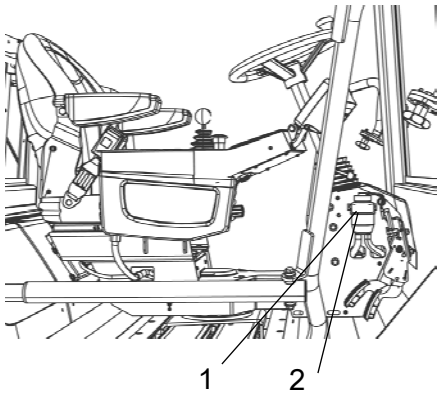


Fig. Brake fluid container
1. Brake fluid container
2. Filler cap

Check every day that the fluid level is between the max/min marks.

Open the container, which is placed under a plastic cover on the right side of the steering column.

Top up with hydraulic oil to the max mark on the container if the level is below the min mark.

Fuel tank - Refueling

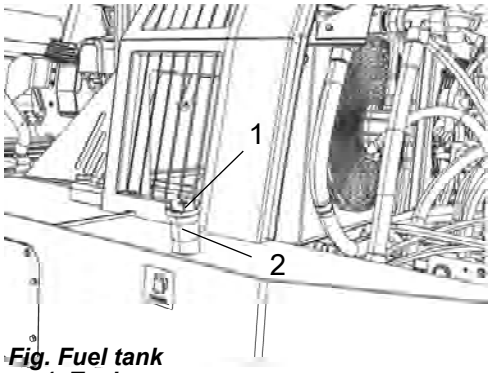


Fig. Fuel tank
1. Tank cap
2. Filler pipe

Never refuel while the engine is running. Do not smoke and avoid spilling fuel.

The filler pipe and tank cap are behind the operator platfrom on the left side of the frame.

Refuel the tank every day before starting work, or fill the tank at end of work. Unscrew the lockable tank cap (1) and fill fuel up to the lower edge of the filler pipe.

The tank holds 210 liters (55.4 gal) of fuel. Refer to the engine manual for information on diesel grade.

Hydraulic reservoir - Check fluid level

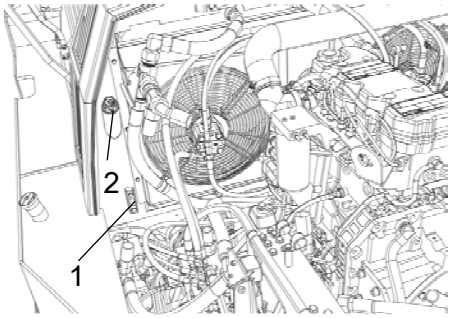


Figure. Hydraulic reservoir
1. Oil sight glass
2. Filler cap

The filler pipe and sight glass are on the left side of the fan cover in the engine compartment.

Place the roller on a level surface and check that the oil level in the sight glass (1) is between the max and min markings. Top up with the type of hydraulic fluid specified in the lubricant specification, if the level is too low.

Water tank, Std - Filling

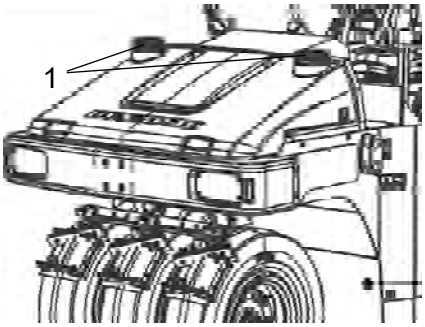


Fig. Water tank
1. Tank cap

There are two filler caps on the top of the tank.

Unscrew the tank cap (1) and fill with clean water. Do not remove the strainer.

Fill the water tank; it holds 900 liters (238 gal).

Only additive: A small amount of environment-friendly antifreeze.

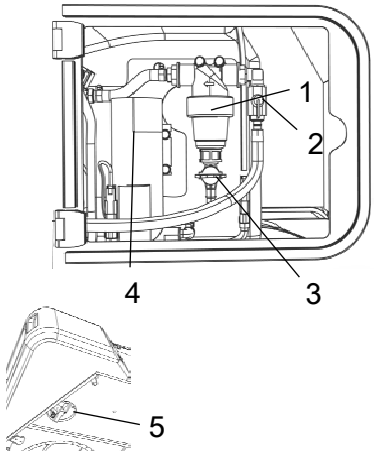


Fig. Pump system, front frame right side
1. Coarse filter
2. Stop cock
3. Drain cock, filter
4. Water pump
5. Drain cock

Cleaning the coarse filter

To clean the coarse filter (1) open the drain cock (3) on the filter and allow any dirt to run out.

If necessary close the cock (2) and clean the filter and filter housing. Check that the rubber gasket in the filter housing is intact.

After inspecting and cleaning, reset and start the system to check that it works.

A drain cock (5) is placed under the water tank on the left side of the front part of the frame. This can be used to drain the tank and the pump system.

An extra pump (6) can be installed in case the standard water pump stops working. See section for emergency watering.

To drain the complete sprinkler system, see section for Watering system - Draining, 2,000 h.

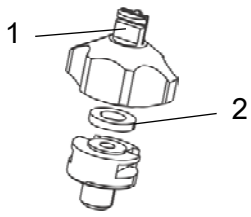


Fig. Nozzle
1. Sleeve, nozzle, filter
2. Packing

Sprinkler system
Cleaning of sprinkler nozzle

Dismantle the blocked nozzle by hand.

Blow the nozzle and fine filter (1) clean using compressed air. Alternatively, fit replacement parts and clean the blocked parts later on.

Nozzle	Colour	Ø (mm)	l/min (2.0 bar)	gal/min (40 psi)
Standard	yellow	0.8	0.63	0.20
Option	blue	1.0	1.00	0.31
Option	red	1.2	1.25	0.39
Option	brown	1.3	1.63	0.50

After inspecting and carrying out any necessary cleaning, start the system and check that it works.

Wear protective goggles when working with compressed air.

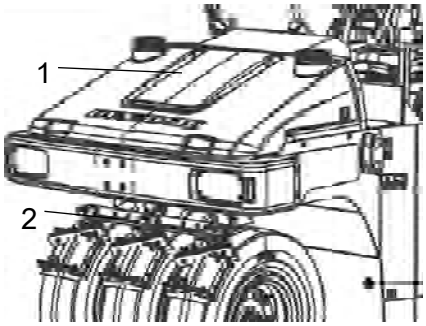


Fig. Wheel rack
1. Water tank
2. Sprinkler nozzle

Sprinkler system - Check

Fill the tank with emulsion fluid, e.g. water mixed with 2% cutting fluid. Check that the sprinkler nozzles (2) are not blocked, and if necessary clean them and the filter. See under Sprinkler system, Check - Cleaning, for detailed instructions.

Inspect the tire treads from time to time to ensure that no asphalt has stuck to the tires. This can happen before the tires have warmed up.

Fluids that are flammable or detrimental to the environment must not be used in the emulsion tank.

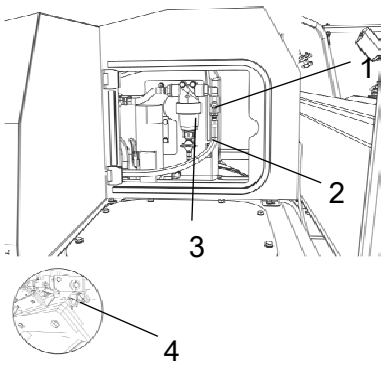


Fig. Sprinkler pump
1. Valve
2. Hose
3. Coarse filter
4. Valve

Sprinkler system - Freeze risk

Preventive measures when there is a risk of freezing.

Draining the system.

- Close the valve (1)
- Separate the hose (2)
- Open the coarse filter (3)
- Loosen the intake to the pump by moving the plastic clamp to the left and pulling the white plastic adapter from the pump housing.
- Open the valves in the ends (4) of the sprinkler pipes.
- Allow the fluid to run out and run the sprinkler pump for about 10 seconds.

Freeze protection

Freeze protection can also be achieved by connecting a separate container, after dividing the hose, with water mixed with glycol and running approx. 2 liters in the system.

Wheel scrapers
Control

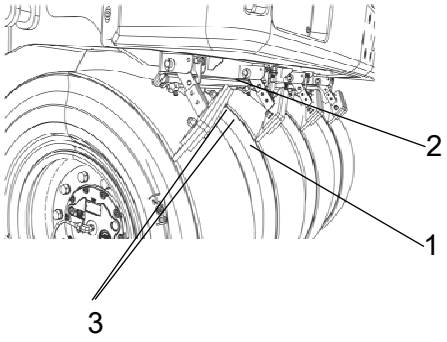


Fig. Tire scrapers *1-2 mm*
1. Scraper blades
2. Locking hook
3. Adjusting screw

Check that the tires and scrapers are worn evenly.

If there is uneven wear on the scraper, release the adjusting screw (3) on the back of the scraper attachment.

Pull down the scraper blade (1) so that it is flush with the tire.

Tighten the screws (3) again after adjusting.

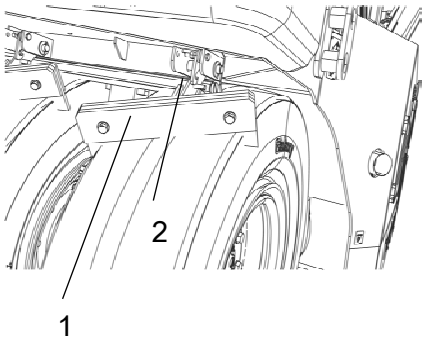


Fig. Tire scrapers
1. Scraper blades
2. Locking hook

The scrapers must hang free from the tires during transportation.

Lift up the scraper blades (1) and make sure that they are locked in raised position by the looking hooks (2).

To lower down the scrapers, lift the scraper slightly while pressing in the locking hook.

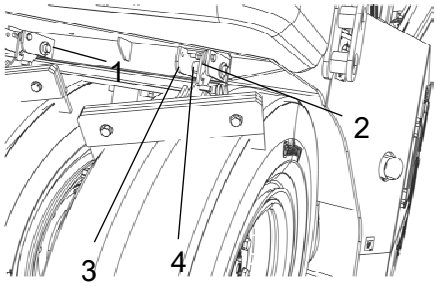


Fig. Scrapers
1. Pin
2. Hairpin
3. Locking hook
4. Scraper attachment

Removing the scapers

The scrapers can easily be removed for cleaning and inspection.

First secure the scraper in the locking hook (3), placed on the scraper attachment(4), to prevent the scraper dropping onto the ground.

Release the pin (1) on the hook-up axle by removing the hairpins (2) on each side of the pin. Grip the up-hook axle and pull it straight out.

When refitting after inspection etc., the scraper must first be hooked in the locking hook before the hook-up axle is put in position.

Refit the pin (1) and make sure that it is well secured by the hairpins (2).

Maintenance - 50h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Air cleaner

Checking - Change the main air filter

Change the air cleaner main filter when the warning lamp on the control panel comes on when the engine is running at maximum speed.

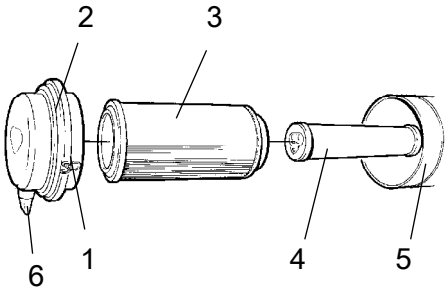


Fig. Air cleaner
1. Clips
2. Cover
3. Main filter
4. Backup filter
5. Filter housing
6. Dust valve

Release the clips (1), pull off the cover (2), and pull out the main filter (3).

Do not remove the backup filter (4).

Clean the air cleaner if necessary, see section Air cleaner - Cleaning.

When replacing the main filter (3), insert a new filter and refit the air cleaner in the reverse order.

Check the condition of the dust valve (6); replace if necessary.

When refitting the cover, make sure that the dust valve is positioned downwards.

Backup filter - Change

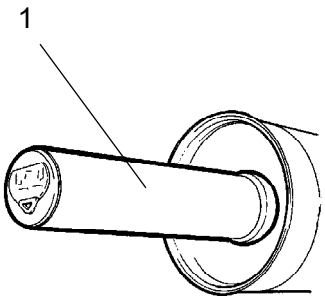


Fig. Air filter
1. Backup filter

Change the backup filter with a new filter after every third replacement of the main filter.

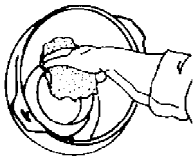
To change the backup filter (1), pull the old filter out of its holder, insert a new filter and reassemble the air cleaner in the reverse order.

Clean the air cleaner if necessary, see section Air cleaner - Cleaning.

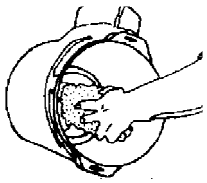
Air cleaner - Cleaning

Wipe clean the inside of the cover (2) and the filter housing (5). See the previous illustration.

Wipe clean on both sides of the outlet pipe.



Inner edge of outlet pipe.



Outer edge of outlet pipe.

Wipe also both surfaces for the outlet pipe; see adjacent figure.

Check that the hose clamps between the filter housing and the suction hose are tight and that the hoses are intact. Inspect the entire hose system, all the way to the engine.

Fuel filter - Draining

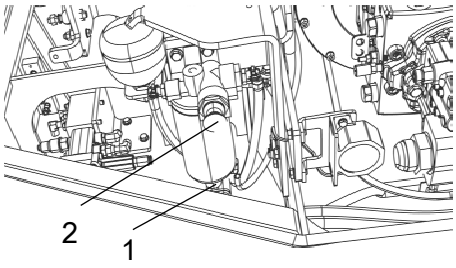


Fig. Fuel filter
1. Drain plug
2. Hand pump

Unscrew the drain plug (1) at the bottom of the fuel filter.

With the aid of the secondary hand-operated pump, make certain that all sediment comes out. See Cummins service manual.

Tighten the drain plug as soon as uncontaminated fuel runs out.

Place in a suitable container and hand in to environment-friendly waste disposal station.

Air conditioning (Optional) - Inspection

Park the roller on a level surface, chock the wheels and set the Forward/Reverse lever in the "P" position.

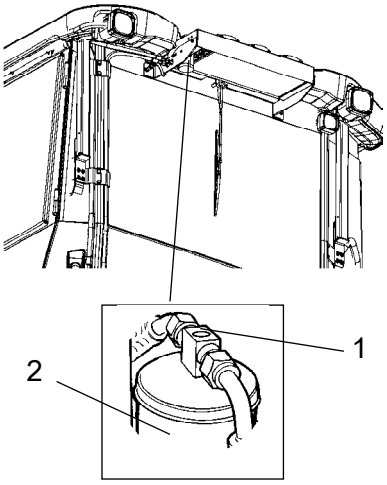


Fig. Drying filter
1. Sight glass
2. Filter holder

With the unit in operation, check using the sight glass (1) that bubbles are not visible on the drying filter.

Make sure the Forward/Reverse lever is always in the "P" position.

The filter is located on the top of the rear part of the cab roof. If bubbles are visible through the sight glass, this is a sign that the refrigerant level is too low. Stop the unit to avoid risking damage. Fill up with refrigerant.

Air conditioning (Optional) - Cleaning

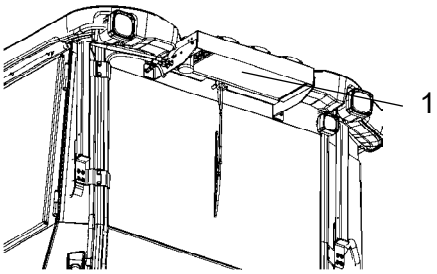


Fig. Cab
1. Condensor element

If there is a signifcant loss of cooling capacity, clean the condensor element (1) on the rear edge of the cab roof.

Tires - Tire pressure

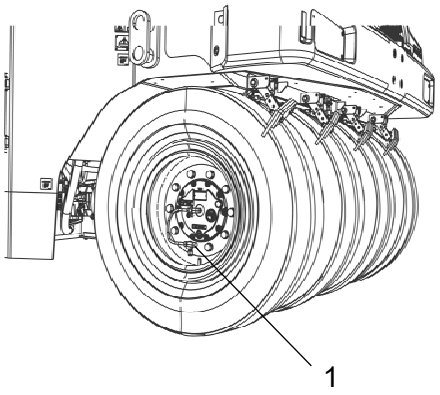


Fig. Outer wheels
1. Air valve

Check the tire pressure with a pressure gauge.

Make sure that the tires have the same pressure.

Recommended pressure: See Technical Specifications.

The figure shows the position of the air valve on the outer tires.

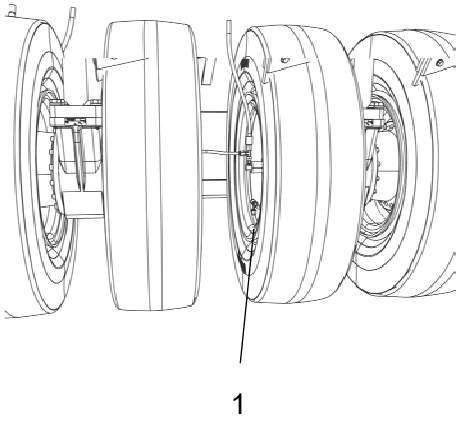


Fig. Inner wheels
1. Air valve

The figure shows the position of the air valve on the inner tires.

Check the Safety Manual that accompanies the roller before filling the tires with air.

Upper/Lower Pivot bearing - Lubrication

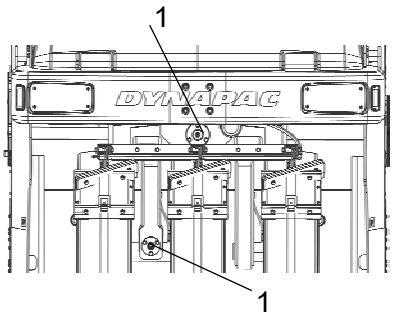


Fig. Pivot bearing
1. Lubricating nipple x1, upper pivot bearing
2. Lubricating nipple x1, lower pivot bearing

Lubricate the nipple (1) on the upper pivot bearing and the nipple (2) on the lower pivot bearing with five pump strokes from hand-operated grease gun.

Use grease as specified in the lubricant specification.

Wheel gear - Oil change

Take great care when draining the fluid. Wear protective gloves and goggles.

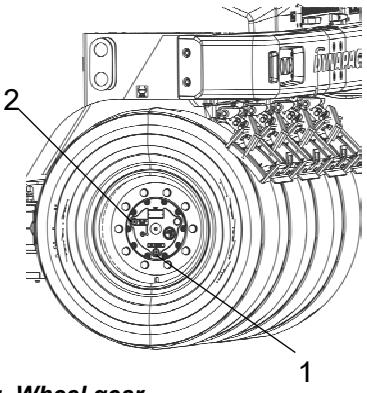


Fig. Wheel gear
1. Drain plug
2. Filler plug

Set the roller so that the drain plug (1), the large plug, is at the lowest position in its rotation.

Place a receptacle that holds at least 20 liters (5.3 gal) under the drain plug.

Unscrew the drain plug (1) and filler plug (2) to evacuate air. Allow all the oil to drain out and refit the plug.

Deliver the drain oil to environmentally correct handling.

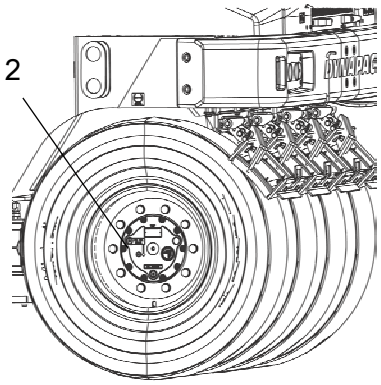


Fig. Replenishing oil - wheel gear
2. Filler plug
3. Level plug

Wheel gear - Replenishing the oil

Move the machine so that the filler hole is correctly positioned. The hole should be just over the horizontal position to simplify filling.

Unscrew the filler plug (2). Unscrew the level plug (3) as well to evacuate air. Oil is only filled from the outside of the gears.

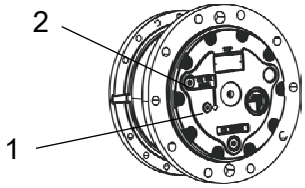


Fig. Wheel gear

Fill up with approx. 8 l (8.5 qts) or new oil. Use transmission oil, see lubricant specifications.

Move the machine so that the level plug (3) is in horizontal position.

Ensure that the oil level reaches up to the lower edge of the plug hole.

Clean and refit the plugs.

Wheel gear - Checking the oil level

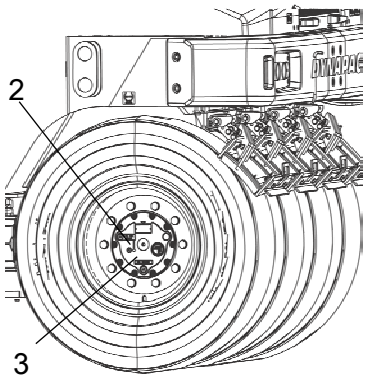


Fig. Level check - wheel gear
2. Filler plug
3. Level plug

Move the machine so that the level plug (3) is in horizontal position.

Wipe clean the area around the level plug (3) and then undo the plug.

Ensure that the oil level reaches up to the lower edge of the plug hole.

Replenish the oil to the right level if the level is low. Use transmission oil, see lubricant specifications.

Clean and refit the plugs.

Maintenance - 250h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Diesel engine
Oil change

The engine's oil drain plug is located at the back on the right side of the machine. The drain plug can be accessed by opening the panel in front of the exhaust pipe.

Drain the oil when the engine is warm. Place a receptacle that holds at least 14 liters (15 qts) under the drain plugs.

Take great care when draining engine oil. Wear protective gloves and goggles.

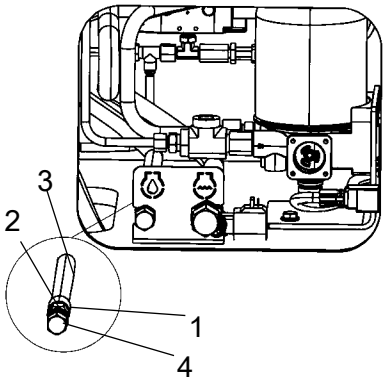


Fig. Drain plugs
1. Hex nut
2. Bulkhead elbow
3. Hose
4. Drain plug

Release the hex nut (1) as shown (2).

Pull out the hose (3) and release the oil drain plug (4). Allow all the oil to run out into a container.

To refit, secure the plug (4) as shown and push in the hose.

Secure as shown and then tighten the hex nut (1).

Deliver the drain oil for environmentally correct handling.

Fill with fresh engine oil, see Lubricant specification or the engine manual for the correct grade of oil.

Fill with the requisite volume of engine oil. See technical specifications before starting the machine.

Allow the engine to idle for a few minutes, and then switch off the engine.

Check the dipstick to ensure that the engine oil level is correct. Refer to the engine manual for details. Top up with oil if necessary to the max mark on the dipstick.

Engine
Replacing oil filter

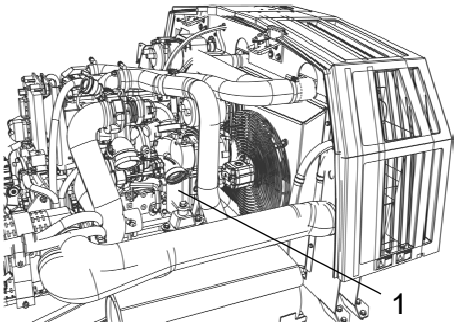


Fig. Engine compartment
1. Oil filter

The oil filter (1) is located on the right side in the engine compartment.

See the engine manual for information about replacing the filter.

Hydraulic fluid cooler
Checking - Cleaning

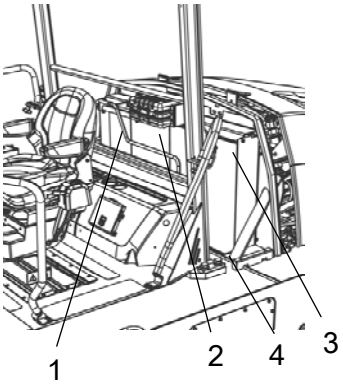


Fig. Cooler
1. Charge air cooler
2. Water cooler
3. Hydraulic fluid cooler
4. Cooler grill

The water and hydraulic fluid coolers are accessible when the cooler grill (4) is removed.

Make sure that the air flow through the cooler is unobstructed. Dirty coolers are blown clean with compressed air or washed clean using a high-pressure water cleaner.

Take care when using a high-pressure water jet. Do not hold the nozzle too near the cooler.

Wear protective goggles when working with compressed air or high-pressure water jets.

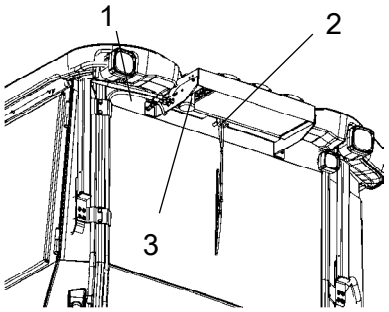


Fig. Air conditioning
1. Refrigerant hoses
2. Condensor element
3. Drying filter

Air conditioning (Optional)
- Inspection

Inspect refrigerant hoses and connections and make sure that there are no signs of an oil film that can indicate a refrigerant leakage.

If there is a signifcant loss of cooling capacity, clean the condensor element (2) on the rear edge of the cab roof.

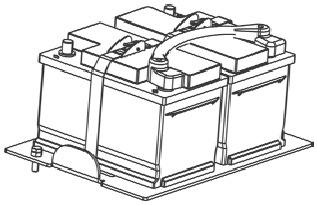


Fig. Batteries

Battery
- Check condition

The batteries are sealed and maintenance-free.

Make sure there is no open flame in the vicinity when checking the electrolyte level. Explosive gas is formed when the alternator charges the battery.

When disconnecting the battery, always disconnect the negative cable first. When connecting the battery, always connect the positive cable first.

The cable shoes should be clean and tightened. Corroded cable shoes should be cleaned and greased with acid-proof Vaseline.

Wipe the top of the battery.

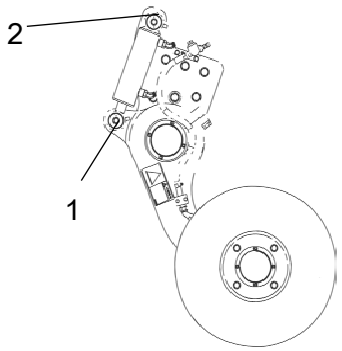


Figure. Two grease points for lubricating the edge cutter

Edge cutter (Optional) - Lubrication

Refer to the operation section for information on how to operate the edge cutter.

Grease the two points as shown in the figure.

Grease should always be used for lubrication, see the lubricant specifications.

Grease all bearing points with five strokes of a hand-operated grease gun.

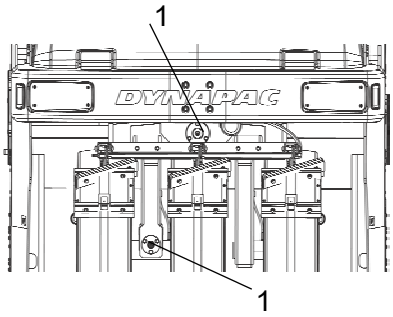


Fig. Pivot bearing
1. Lubricating nipple x1, upper pivot bearing
2. Lubricating nipple x1, lower pivot bearing

Upper/Lower Pivot bearing - Lubrication

Lubricate the nipple (1) on the upper pivot bearing and the nipple (2) on the lower pivot bearing with five pump strokes from hand-operated grease gun.

Use grease as specified in the lubricant specification.

Maintenance - 500h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

The engine fuel filter - replacement/cleaning

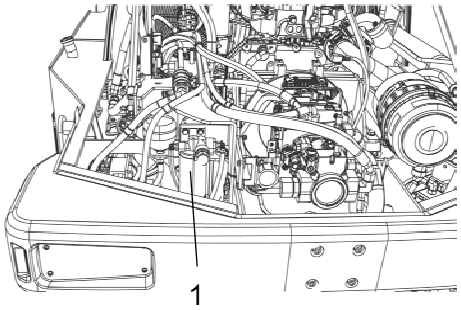


Fig. Engine compartment
1. Prefilter

The fuel filter is located in front of the accumulators on the left side in the engine compartment.

Unscrew the bottom and drain off any water, and then replace the filter unit.

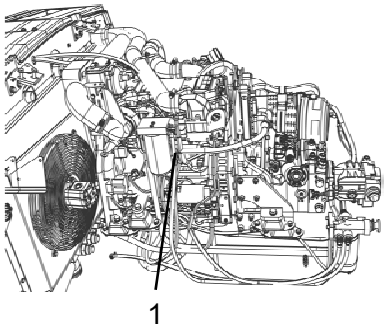


Figure. Engine compartment, right side.
1. Fuel filter

Replace the fuel filter, located on the left side in the engine compartment.

Start the engine and check that the filter is well sealed.

Seat bearing - Lubrication

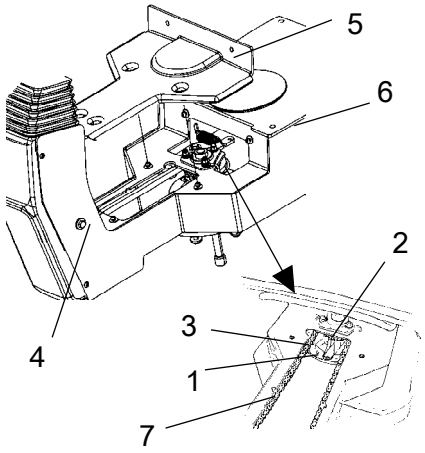


Figure. Seat bearing
1. Grease nipple
2. Gearwheel
3. Steering chain
4. Adjusting screw
5. Cover
6. Slide rails
7. Marking

Keep in mind that the chain is a vital part of the steering mechanism.

Remove the cover (5) to access the lubrication nipple (1). Lubricate the operator seat slew bearing with three strokes of a hand-operated grease gun.

Clean and grease the chain (3) between the seat and the steering column.

Also grease the seat slide rails (6).

If the chain is slack on the sprocket (2), loosen the screws (4) and move the steering column forward. Tighten the screws and check chain tension.

No not tension the chain too tightly. It should be possible to move the chain about 10 mm (0.4 in) to the side with a forefinger/thumb at the marking (7) in seat frame. Fit the chain lock at the bottom.

If the seat starts to be stiff when adjusting, it should be lubricated more often than specified here.

Hydraulic reservoir cap - Check

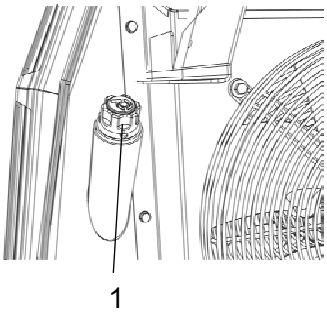


Fig. Left side of frame
1. Tank cap

Unscrew and make sure that the reservoir cap is not clogged. Air must have unobstructed passage through the cap in both directions.

If passage in either direction is blocked, clean the filter with a little diesel oil and blow through with compressed air until the block is removed, or replace the cap with a new one.

Wear protective goggles when working with compressed air.

Pivot bearing - Lubrication

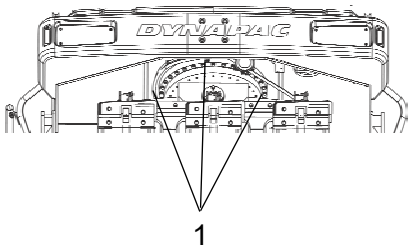


Fig. Rear drum
1. Grease nipples x 4

Grease each nipple (1) with five strokes of a hand-operated grease gun.

Use grease as specified in the lubricant specification.

Upper/Lower Pivot bearing - Lubrication

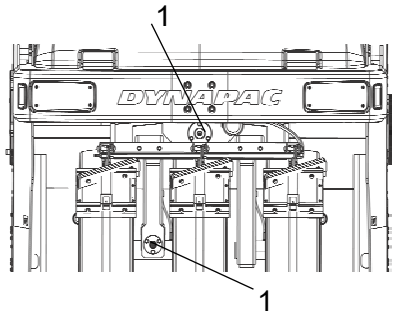


Fig. Pivot bearing
1. Lubricating nipple x1, upper pivot bearing
2. Lubricating nipple x1, lower pivot bearing

Lubricate the nipple (1) on the upper pivot bearing and the nipple (2) on the lower pivot bearing with five pump strokes from hand-operated grease gun.

Use grease as specified in the lubricant specification.

Maintenance - 1000h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Air filter - Changing

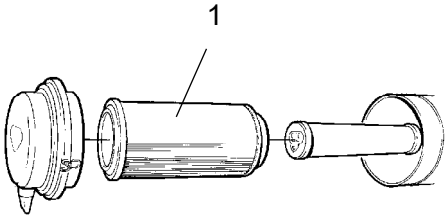


Fig. Air cleaner
1. Main filter

Replace the air cleaner main filter (1) even if it has not been cleaned five times See under the heading 'Every 50 hours of operation' for information on changing the filter.

If a blocked filter is not replaced, the exhaust fumes will be black and the engine will loose power. There is also a risk of severe damage to the engine.

Backup filter - Change

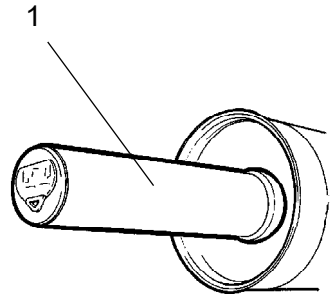


Fig. Air filter
1. Backup filter

Change the backup filter with a new filter after every fifth replacement or cleaning of the main filter.

The safety filter must not be cleaned.

To change the backup filter (1), pull the old filter out of its holder, insert a new filter and reassemble the air cleaner in the reverse order.

Hydraulic filter
Change

The hydraulic filters are located on the left side in the engine compartment, behind the battery disconnector.

Remove the filter (1) and hand in to waste disposal station. This is a disposable filter and cannot be cleaned.

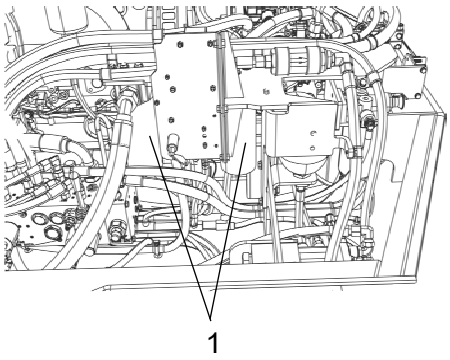


Fig. Engine compartment
1. Hydraulic fluid filter

Thoroughly clean the filter holder sealing surface.

Apply a thin coat of fresh hydraulic fluid to the rubber gasket on the new filter.

Screw the filter on by hand, firstly until the filter gasket makes contact with the filter base. Then rotate a further ½ turn.

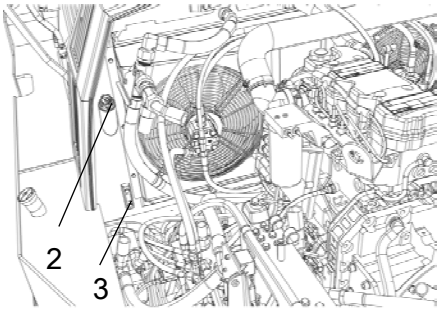


Figure. Hydraulic tank
2. Tank cap
3. Sight glass

Check the hydraulic fluid level in the sight glass (3) and top off as required. See under the heading 'Every 10 hours of operation' for more information.

Start the engine and check that the filter does not leak.

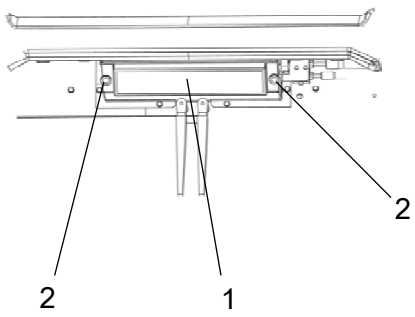


Fig. Cab, front
1. Fresh air filter (x1)
2. Screw (x2)

Cab
Fresh air filter - Replacing

There is one fresh air filter (1), placed on the front of the cab.

Remove the protective cover.

Undo the screws (2) and remove the complete holder. Remove the filter insert and replace with a new filter.

The filter may need to be changed more often if the machine is operated in a dusty environment.

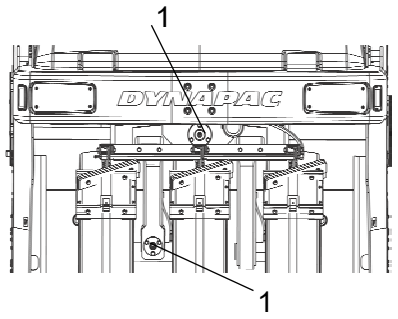


Fig. Pivot bearing
1. Lubricating nipple x1, upper pivot bearing
2. Lubricating nipple x1, lower pivot bearing

Upper/Lower Pivot bearing - Lubrication

Lubricate the nipple (1) on the upper pivot bearing and the nipple (2) on the lower pivot bearing with five pump strokes from hand-operated grease gun.

Use grease as specified in the lubricant specification.

Wheel gear - Oil change

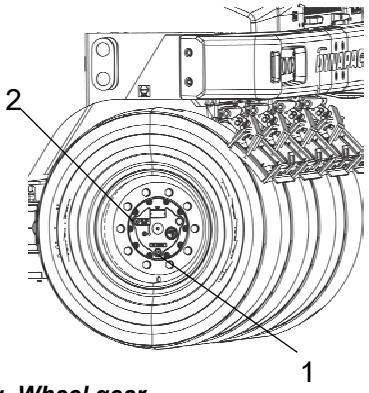


Fig. Wheel gear
1. Drain plug
2. Filler plug

Take great care when draining the fluid. Wear protective gloves and goggles.

Set the roller so that the drain plug (1), the large plug, is at the lowest position in its rotation.

Place a receptacle that holds at least 20 liters (5.3 gal) under the drain plug.

Unscrew the drain plug (1) and filler plug (2) to evacuate air. Allow all the oil to drain out and refit the plug.

Deliver the drain oil to environmentally correct handling.

Wheel gear - Replenishing the oil

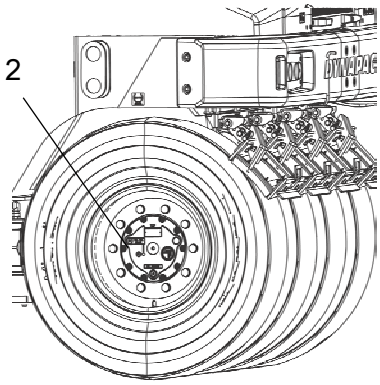


Fig. Replenishing oil - wheel gear
2. Filler plug
3. Level plug

Move the machine so that the filler hole is correctly positioned. The hole should be just over the horizontal position to simplify filling.

Unscrew the filler plug (2). Unscrew the level plug (3) as well to evacuate air. Oil is only filled from the outside of the gears.

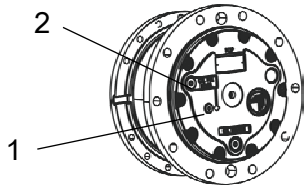


Fig. Wheel gear

Fill up with approx. 8 l (8.5 qts) or new oil. Use transmission oil, see lubricant specifications.

Move the machine so that the level plug (3) is in horizontal position.

Ensure that the oil level reaches up to the lower edge of the plug hole.

Clean and refit the plugs.

Wheel gear - Checking the oil level

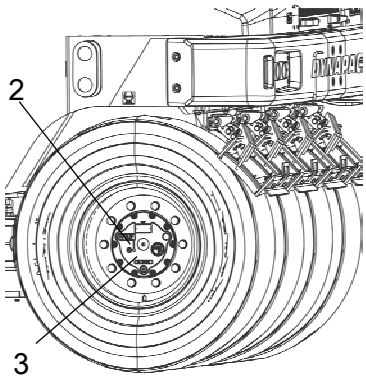


Fig. Level check - wheel gear
2. Filler plug
3. Level plug

Move the machine so that the level plug (3) is in horizontal position.

Wipe clean the area around the level plug (3) and then undo the plug.

Ensure that the oil level reaches up to the lower edge of the plug hole.

Replenish the oil to the right level if the level is low. Use transmission oil, see lubricant specifications.

Clean and refit the plugs.

Maintenance - 2000h

Park the roller on a level surface.
When checking and making adjustments to the roller, switch the engine off and make sure the Forward/Reverse lever is in the "P" position.

Ensure that there is good ventilation (air extraction) if the engine is run indoors. Risk of carbon monoxide poisoning.

Hydraulic reservoir
Fluid change

Take care when draining the hydraulic fluid. Wear protective gloves and goggles.

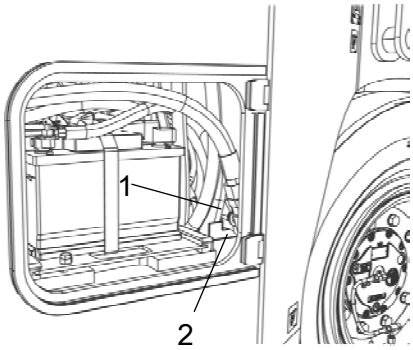


Fig. Battery cover
1. Drain cock
2. Plug

Open the battery cover located in front of the rear wheels on the left side. There is a drain cock (1) and plug (2) on the right side inside the cover.

Place a receptacle that holds at least 50 liters (13.2 gal) under the engine compartment.

Remove the hose attached to the drain cock (1). Remove the plug (2) on the end of the hose and open the drain cock (1).

Allow all the oil to run out. Reset by refitting the plug (2) and close the drain cock (1).

Deliver the drained fluid to environmentally correct handling.

Fill with fresh hydraulic fluid. Refer to the lubricants specification for grade information.

Replace the hydraulic filter. See section "Maintenance - 1000 hours".

Start the engine and operate the hydraulic functions. Check the level in the reservoir and top off as required.

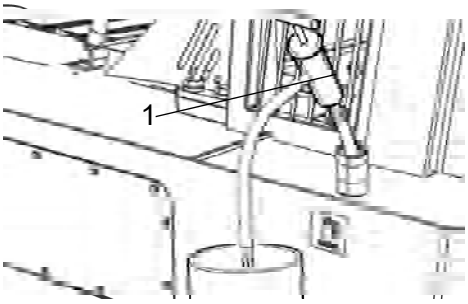


Fig. Fuel tank
1. Oil drain pump

Fuel tank
- Cleaning

It is easiest to clean the tank when it is almost empty.

Pump out any bottom sediment using a suitable pump, such as an oil drain pump.

Place in a suitable container and hand in to environment-friendly waste disposal station.

Keep in mind fire risk when handling fuel.

Watering system
- Draining

Remember that there is a risk of freezing during the winter. Empty the tank, pump, filter and lines, or mix antifreeze in the water.

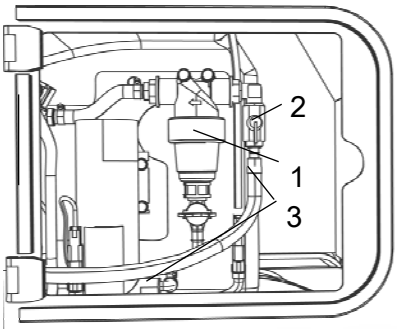


Fig. Pump system
1. Filter housing
2. Stop cock
3. Quick couplings

There is a drain cock in the area for the pump system on the water tank. This can be used to drain both the tank and parts of the pump system.

The water hoses are connected to the pump with quick couplings (3) to simplify draining and where appropriate replacement to a reserve pump (option).

Water tank - Cleaning

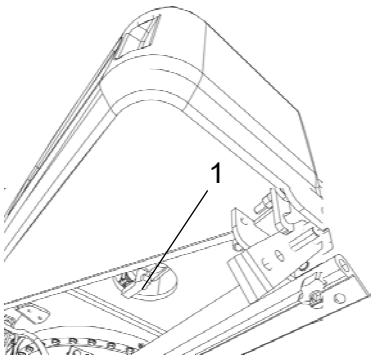


Fig. Water tank
1. Drain cock

Clean the tank with water and a suitable detergent for plastic surfaces.

Close the drain cock (1), fill with water and check for leaks.

The water tank is made of plastic (polyethylene) and can be recycled.

Air conditioning (Optional) - Overhaul

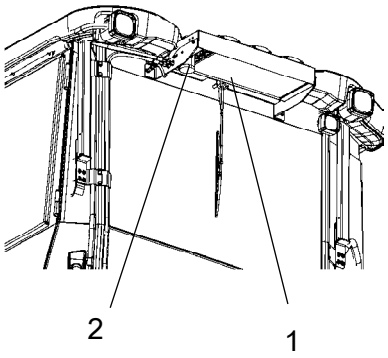


Figure. Cab
1. Condensor element
2. Drying filter

Regular inspection and maintenance is necessary to ensure satisfactory long-term operation.

Clean all dust from the condenser element (1) using compressed air. Blow from above downwards.

The air jet can damage the element flanges if it is too powerful.

Wear protective goggles when working with compressed air.

Inspect the condenser element attachment.

Check the system hoses for chafing. Make sure that drainage from the cooling unit is unobstructed so that condensation does not accumulate inside the unit.

Air conditioning (Optional)
Drying filter - Inspection

With the unit in operation, check using the sight glass (1) that bubbles are not visible on the drying filter.

Park the roller on a level surface, chock the wheels and set the Forward/Reverse lever in the "P" position.

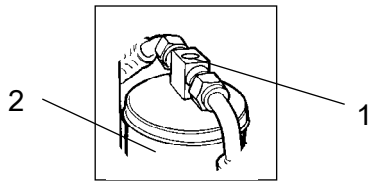


Fig. Drying filter
1. Sight glass
2. Filter holder

The filter is placed at the top of the rear part of the cab roof.
If bubbles are visible through the sight glass, this indicates that the refrigerant level is too low. Stop the unit to avoid risking damage. Fill up with refrigerant.

The refrigerant circuit is only to be worked on by authorized companies.

Engine
Replacing the coolant

The drain plug for the coolant is located at the back on the right side of the machine. The drain plug can be accessed by opening the panel in front of the exhaust pipe.

Drain the coolant when the engine is warm. Place a container that holds at least 14 liters (15 qts) under the drain plugs.

Observe caution when draining the coolant. Wear protective gloves and goggles.

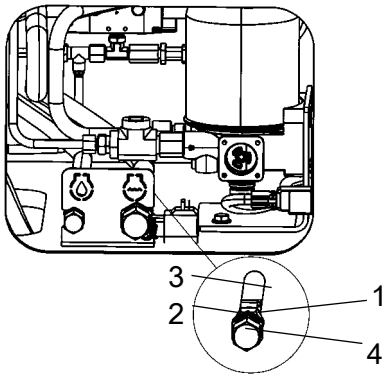


Fig. Drain plugs
1. Hex nut
2. Bulkhead elbow
3. Hose
4. Drain plug

Release the hex nut (1) as shown (2).

Pull out the hose (3) and release the drain plug (4) for the coolant. Allow all the coolant to run out into a container.

To refit, secure the plug (4) as shown and push in the hose.

Secure as shown and then tighten the hex nut (1).

Hand in the drained coolant to an environment-friendly waste disposal station.

Fill up with new coolant, refer to engine manual.

Fill with the requisite volume of coolant. See technical specifications before starting the machine. Allow the engine to idle for a few minutes, and then switch off the engine.

Check the dipstick to ensure that the engine oil level is correct. Refer to the engine manual for details. Top up with oil if necessary to the max mark on the dipstick.

Upper/Lower Pivot bearing - Lubrication

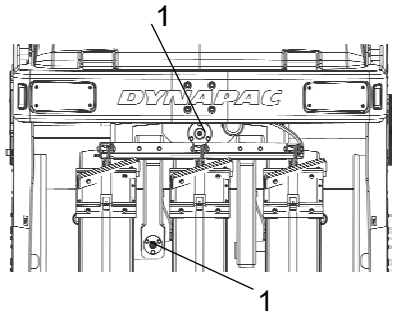


Fig. Pivot bearing
1. Lubricating nipple x1, upper pivot bearing
2. Lubricating nipple x1, lower pivot bearing

Lubricate the nipple (1) on the upper pivot bearing and the nipple (2) on the lower pivot bearing with five pump strokes from hand-operated grease gun.

Use grease as specified in the lubricant specification.

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