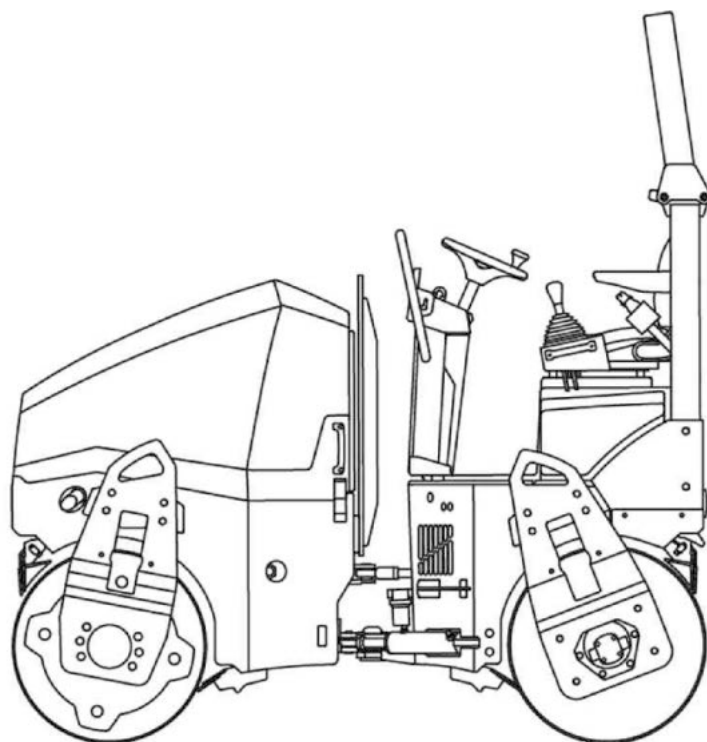




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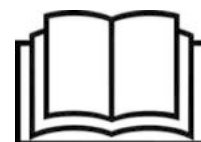
Bobcat®

Operation & Maintenance Manual



Tandem Roller

(ATR23 - Non-CE) S/N B5EY*3000000 & Above
(ATR26 - Non-CE) S/N B5EZ*3000000 & Above
(ATR23 - CE) S/N B5F8*3000000 & Above
(ATR26 - CE) S/N B5F9*3000000 & Above



ES / EU Prohlášení o shodě

(Původní ES/EU prohlášení o shodě / Original EC/EU Declaration of conformity / Ursprüngliche EG-/EU-Konformitätserklärung)

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IČ / Identification Number / Ident.-Nr:	000 08 753
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Popis strojního zařízení / Description of the machinery / Beschreibung der Maschineneinrichtung:	
Označení / Designation / Bezeichnung:	Tandemový válec / Tandem roller / Tandemwalze
Typ / Type / Typ:	ATR 23
Verze / Version / Version:	
Výrobní číslo / Serial number / Maschinennummer:	
Motor / Engine / Motor:	Kubota D1703-M-DI, vznětový, jmenovitý výkon (SAE J1995 Gross): 18,5 kW, jmenovité otáčky: 2200 min ⁻¹ . / Kubota D1703-M-DI, Diesel, nominal power (SAE J1995 Gross): 18,5 kW, rated speed: 2200 RPM. / Kubota D1703-M-DI, Dieselmotor, Nennleistung (SAE J1995 Gross): 18,5 kW, Nenndrehzahl: 2200 min ⁻¹ .
Prohlašujeme, že strojní zařízení splňuje všechna příslušná ustanovení uvedených směrnic / We declare, that the machinery fulfils all the relevant provisions mentioned Directives / Wir erklären, dass die Maschineneinrichtung sämtliche entsprechenden Bestimmungen aufgeführter Richtlinien erfüllt:	Strojní zařízení – směrnice 2006/42/ES / Machinery Directive 2006/42/EC / Maschineneinrichtung – Richtlinie 2006/42/EG Elektromagnetická kompatibilita – směrnice 2014/30/EU / Electromagnetic Compatibility Directive 2014/30/EU / Elektromagnetische Kompatibilität – Richtlinie 2014/30/EU Emise hluku – směrnice 2000/14/ES / Noise Emission Directive 2000/14/EC / Lärmemissionen – Richtlinie 2000/14/EG
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Naměřená hladina akustického výkonu / Measured sound power level / Gemessener Schalleistungspegel:	L _{WA} = 104 dB
Garantovaná hladina akustického výkonu / Guaranteed sound power level / Garantierter Schalleistungspegel:	L _{WA} = 106 dB

Místo a datum vydání / Place and date of issue / Ort und Datum der Ausgabe: Nové Město nad Metují,

Osoba zmocněná k podpisu za výrobce / Signed by the person entitled to deal in the name of manufacturer / Zeichnungsberechtigter für den Hersteller:

Jméno / Name / Name:

Jiří Sychra

Funkce / Grade / Stelle:

Logistics Manager

Podpis / Signature / Unterschrift:

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Popis strojního zařízení / Description of the machinery / Beschreibung der Maschineneinrichtung:	
Označení / Designation / Bezeichnung:	Tandemový válec / Tandem roller / Tandemwalze
Typ / Type / Typ:	ATR 26
Verze / Version / Version:	
Výrobní číslo / Serial number / Maschinennummer:	
Motor / Engine / Motor:	Kubota D1703-M-DI, vznětový, jmenovitý výkon (SAE J1995 Gross): 18,5 kW, jmenovité otáčky: 2200 min ⁻¹ . / Kubota D1703-M-DI, Diesel, nominal power (SAE J1995 Gross): 18,5 kW, rated speed: 2200 RPM. / Kubota D1703-M-DI, Dieselmotor, Nennleistung (SAE J1995 Gross): 18,5 kW, Nenndrehzahl: 2200 min ⁻¹ .
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Místo a datum vydání / Place and date of issue / Ort und Datum der Ausgabe: Nové Město nad Metují,

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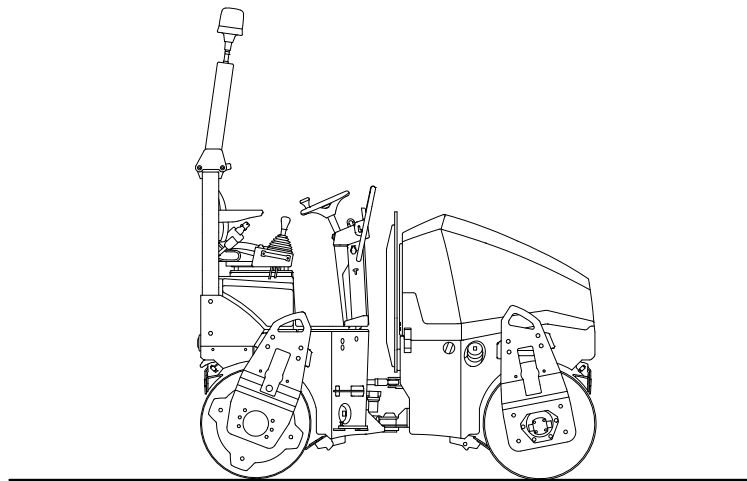
Jméno / Name / Name:

Jiří Sychra

Funkce / Grade / Stelle:

Logistics Manager

Podpis / Signature / Unterschrift:



588026

These instructions are "original instructions for use" within the meaning of paragraph 1.7.4.1 of Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006.

This operating manual consists of:

I. Specification manual

II. Operating manual

III. Maintenance manual

The purpose of this manual is to familiarize operators with safe operation of the roller and provide them information for maintenance. Therefore it is necessary to pass this manual to operators and ensure that it will be read by them carefully before the road roller is used.

Bobcat assumes no responsibility if the machine is operated incorrectly or is used incorrectly in operating modes, which may result in injury or death, damage to the machine or property or environmental pollution.

Adherence to maintenance instructions increases the reliability and lifetime of the machinery and reduces repair costs and down time.

Use only original spare parts for repairs.

The operating instructions must always be kept available on the machine in an appropriate place.

Preface

Information, specifications, and recommended operation and maintenance instructions contained in this publication are basic and final information at the time of the printing of this publication. Print errors, technical modifications and modifications of illustrations are reserved. All dimensions and weights are approximate, and therefore not binding.

Bobcat Company reserves the right to perform modifications at any time with no obligation to inform the machine user. If you identify any differences between the machine operated by you and the information contained in this publication, contact your local dealer.

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SAFETY NOTICE SIGNS



The notice warns of a serious risk of personal injury or other personal hazards.



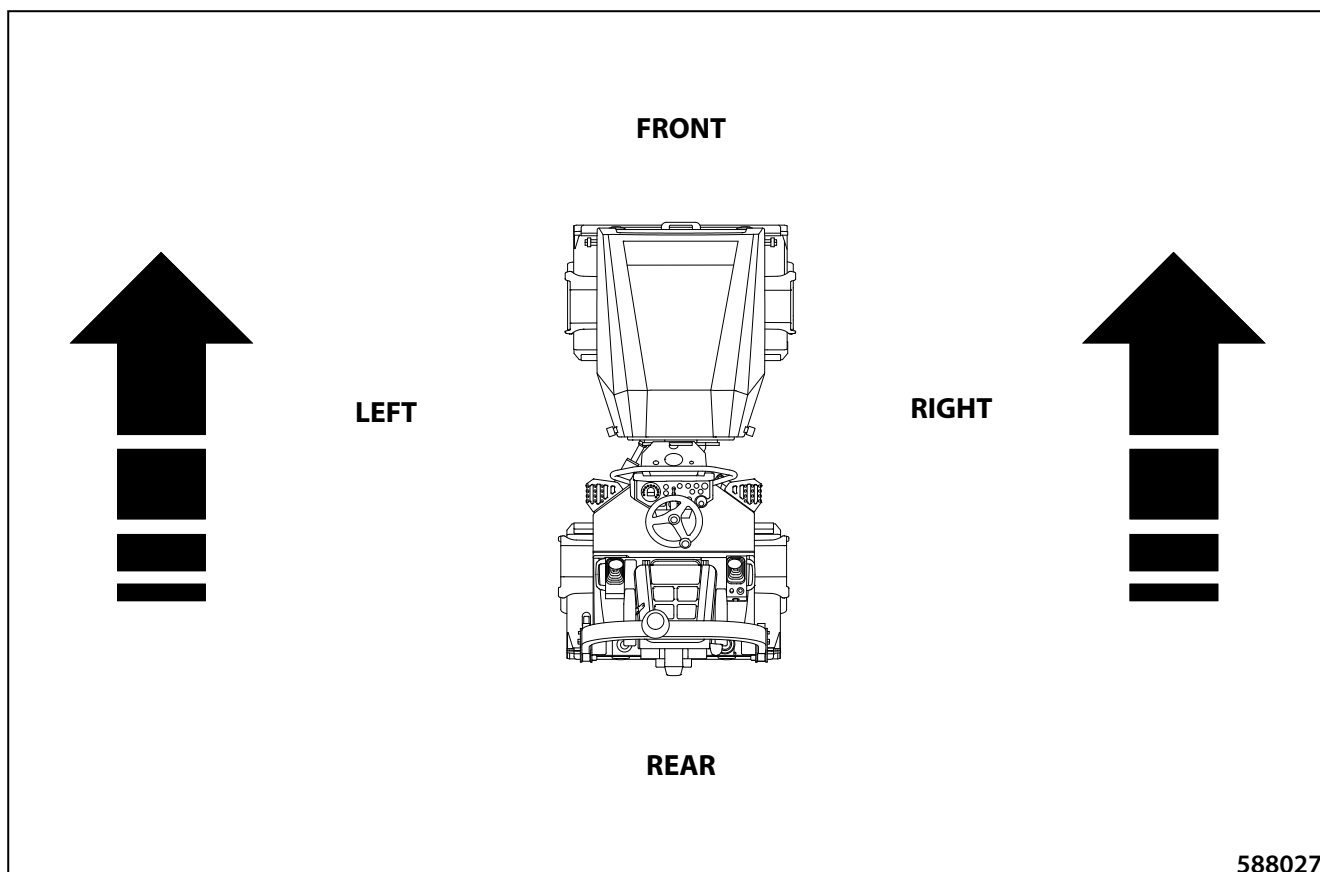
The notice warns of possible damage to the machine or its parts.



The notice warns of the necessity of environmental protection.

! CAUTION!

As used in this operating manual, the terms right, left, front and rear indicate sides of the machine moving forward.



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1 SPECIFICATION MANUAL

1.1 Basic data

Machine description

Tandem machine with an articulated frame and two smooth drums. Both drums are hydrostatic-driven and vibrating. The rear drum vibration is switchable. The concept of the frame allows compacting close to the walls and elevated kerbs on both sides of the machine. It is convenient for works within constrained areas due to its small dimensions and short turning radius. The operator's post provides perfect control of both edges of the drums.

Combined machines have only a front smooth vibrating drum. The rear axle consists of tyres with smooth shoes (compactor).

Specification of the expected use of the machine

The machine is designed for small compaction works in road construction (building local roads, cycle paths, pavements, parking areas and garage driveways) and in building construction (small industrial areas).

The machine is suitable for compacting asphalt mixes up to the (compacted) layer thickness of 120 mm (4.7"), hydraulically consolidated mixtures up to the layer thickness of 150 mm (5.9"), mixed soils up to the layer thickness of 200 mm (7.9") or sandy and gritty materials up to the layer thickness of 300 mm (11.8").

The machine is not suitable for compacting rock fill, loam and clay materials.

The machines are designed for operation in arid, temperate and cold climates according to EN 60721-2-1:2014 with a limited temperature range from -15 °C (5 °F) to +45 °C (113 °F) and a maximum absolute humidity of 25 g.m⁻³. Storage temperature from -25 °C (-12 °F) to + 45 °C (113 °F).

The standard version of the machine is not designed for operation on roads. For more information, please contact your dealer.

The machine that complies with the requirements as to health protection and safety is provided with a nameplate with CE mark.

1. Name – always mentioned only in the English version
2. Type
3. Serial number
4. Rated power
5. Operating weight
6. Maximum weight
7. Shipping weight
8. Version
9. Engine emissions
10. Front axle load
11. Rear axle load
12. Year of manufacture
13. Model year

Nameplate position

Nameplate

Please fill in the following data:
(see nameplate and Kubota engine nameplate)

Machine type
.....

Product Identification Number
.....

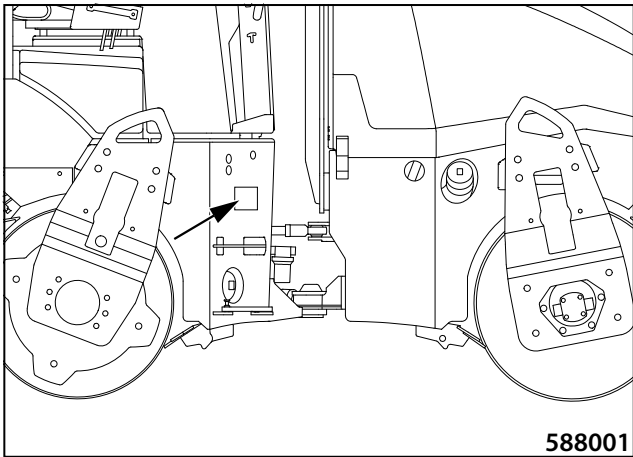
Year of manufacture
.....

Engine type
.....

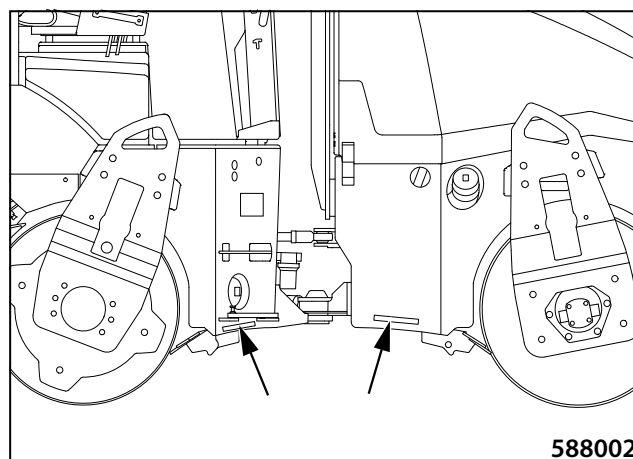
Serial number of the engine
.....

The data mentioned in the table refer always when you contact the dealer or manufacturer.

1			4144	8
2	MANUFACTURED BY: AMMANN CZECH REPUBLIC a.s. 549 01 NOVÉ MĚSTO NAD METUJÍ, Náchodská 145 CZECH REPUBLIC		CE	9
3	DESIGNATION			10
4	TYPE	VERSION		11
5	SERIAL NUMBER			12
6	NOMINAL POWER	kW	ENGINE EMISSIONS	13
7	OPERATING MASS	kg	FRONT AXLE LOAD	
	MAXIMUM MASS	kg	REAR AXLE LOAD	
	SHIPPING MASS	kg	YEAR OF CONSTRUCTION	
			MODEL YEAR	
	MADE IN CZECH REPUBLIC		3478	



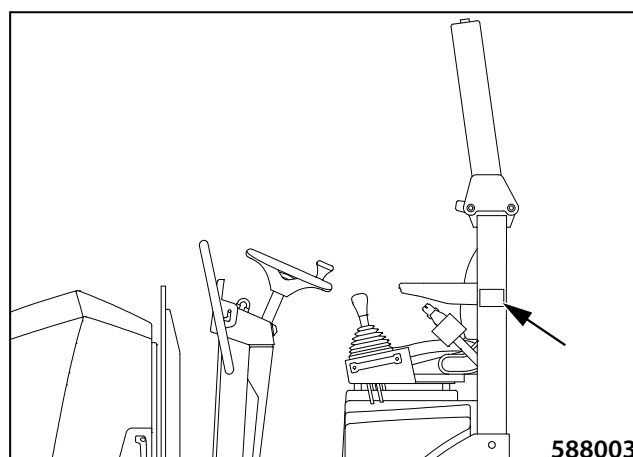
Serial number of the machine frame



588002

Position of the ROPS nameplate

ROPS nameplate



588003

Engine nameplate position

Serial number of the Kubota engine

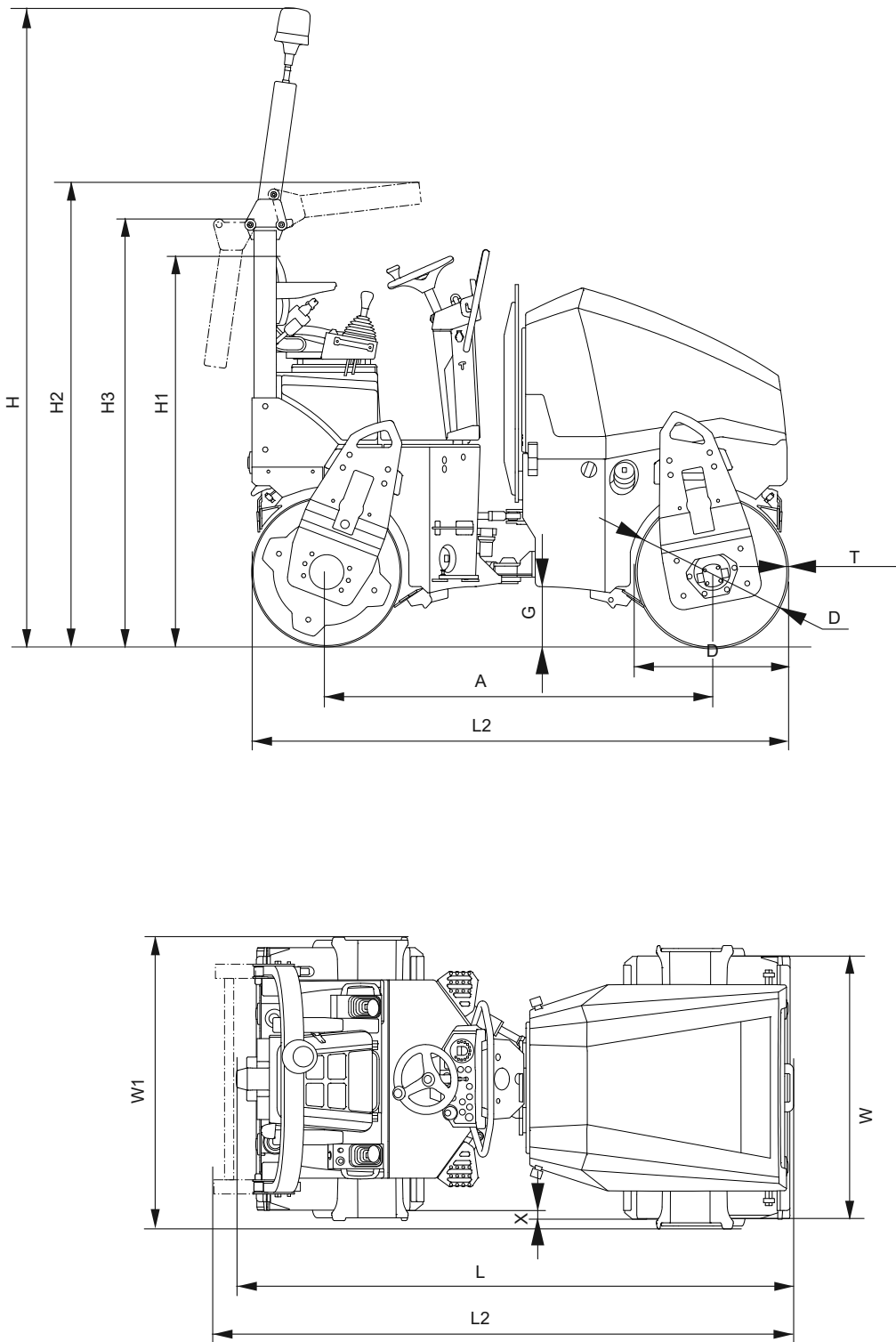


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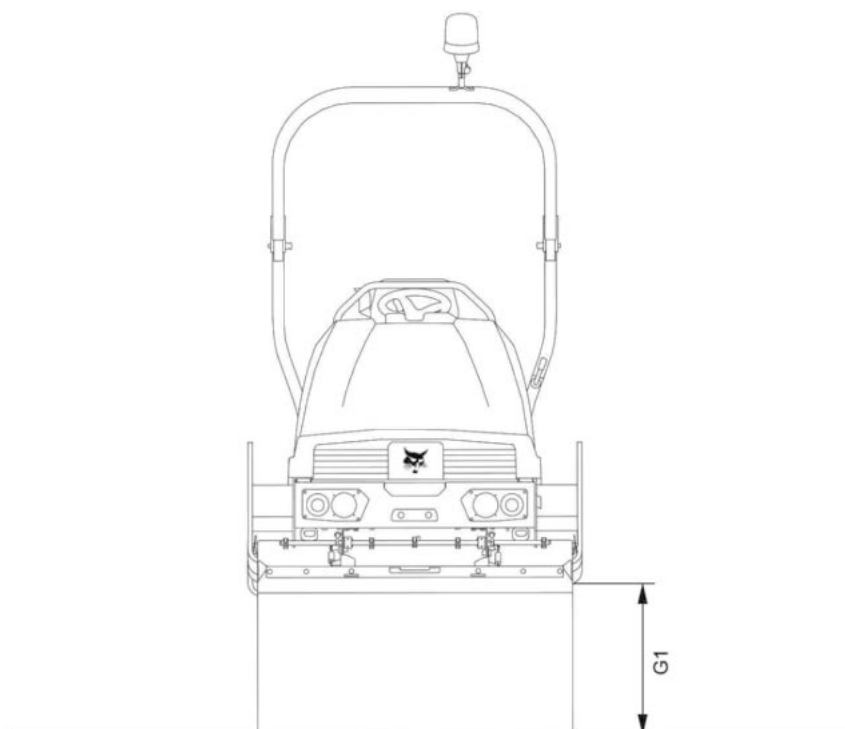


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1.2 Dimensional drawing of the machine



588004A



588611

mm (in)	ATR 23		ATR 26	
	EU Stage V			
A	1740	(68.5)	1740	(68.5)
D	695	(27.4)	695	(27.4)
G	280	(11.0)	280	(11.0)
G1	490	(19.3)	490	(19.3)
H	2550	(100.4)	2550	(100.4)
H1	1815	(71.5)	1815	(71.5)
H2	2140	(84.3)	2140	(84.3)
H3	1935	(76.2)	1935	(76.2)
L	2500	(98.4)	2500	(98.4)
L1	2585	(101.8)	2585	(101.8)
L2	2430	(95.7)	2430	(95.7)
W	1000	(39.4)	1200	(47.2)
W1	1130	(44.5)	1350	(53.1)
X	40	(1.6)	40	(1.6)
T	13	(0.5)	13	(0.5)

1.3 Technical data

		ATR 23	ATR 26
		EU Stage V	
Weight			
Operating weight of EN 500-1+A1 (CECE)	kg (lb)	2260 (4980)	2460 (5420)
Operating load of EN 500-1+A1 (CECE) on front axis	kg (lb)	1070 (2360)	1180 (2600)
Operating load of EN 500-1+A1 (CECE) on rear axis	kg (lb)	1190 (2620)	1280 (2820)
Weight of half fluid capacities	kg (lb)	110 (240)	110 (240)
Operating weight of ISO 6016	kg (lb)	2275 (5020)	2475 (5460)
Maximum weight with accessories	kg (lb)	2495 (5500)	2655 (5850)
Maximum permitted weight according to ROPS	kg (lb)	2850 (6280)	2850 (6280)
Static linear load of front drum	kg/cm (lb/in)	10,7 (20)	9,8 (20)
Static linear load of rear drum	kg/cm (lb/in)	10,9 (20)	10,7 (20)
Weight of Canopy	kg (lb)	35 (80)	35 (80)
Weight of Bobcat edge cutter	kg (lb)	50 (110)	50 (110)
Deduction for the transport weight to the EN 500-1+A1 (CECE) operating weight.	kg (lb)	180 (400)	180 (400)
Driving characteristics			
Maximum transport speed	km/h (MPH)	10 (6,2)	10 (6,2)
Climbing ability without vibration	%	30	30
Climbing ability with vibration	%	25	25
Lateral static stability	%	55	55
Lateral stability during driving without vibration	%	20	20
Lateral stability during driving with vibration	%	10	10
Turning radius inner (edge)	mm (in)	2630 (103,5)	2540 (100)
Turning radius outer (contour)	mm (in)	3750 (147,6)	3910 (153,9)
Type of drive	-	Hydrostatic	Hydrostatic
Number of driving axles	-	2	2
Oscillation angle	°	6,5	6,5
Angle of steering	°	30	30
Steering			
Type of steering	-	Joint	Joint
Steering control	-	Hydraulic	Hydraulic
Linear hydraulic motors	-	1	1

		ATR 23	ATR 26
		EU Stage V	
Engine			
Manufacturer	-	Kubota	Kubota
Type	-	D1703-M-DI	D1703-M-DI
Power according to SAE J1995 Gross	kW	18,5	18,5
Number of cylinders	-	3	3
Cylinder capacity	cm³ (cu in)	1647 (100)	1647 (100)
Nominal speed	min ⁻¹ (RPM)	2200	2200
Working speed I	min ⁻¹ (RPM)	2100	2100
Working speed II	min ⁻¹ (RPM)	2400	2400
Maximum torque	Nm (ft lb)/rpm	97,4 / 1500	97,4 / 1500
Average fuel consumption	l/h (gal US/h)	3,8 (1)	3,8 (1)
Engines complies with emission regulations	-	EU Stage V	EU Stage V
Cooling system of engine	-	Liquid	Liquid
Brakes			
Operating	-	Hydrostatic	Hydrostatic
Parking	-	Mechanical multiple-disc	Mechanical multiple-disc
Emergency	-	Mechanical multiple-disc	Mechanical multiple-disc
Vibration			
Frequency I	Hz (VPM)	58 (3480)	58 (3480)
Frequency II	Hz (VPM)	66 (3960)	66 (3960)
Amplitude I	mm (in)	0,5 (0,02)	0,5 (0,02)
Amplitude II	mm (in)	0,5 (0,02)	0,5 (0,02)
Centrifugal force I	kN	22,1	25,9
Centrifugal force II	kN	28,6	33,5
Type of drive	-	Hydrostatic	Hydrostatic
Watering			
Type of watering	-	Pressure	Pressure
Number of pumps	-	1	1
Number of filtrations	-	2	2
Fluid capacities			
Fuel	l (gal US)	35 (9,2)	35 (9,2)
Water for drum watering	l (gal US)	190 (50,2)	190 (50,2)
Engine (oil filling)	l (gal US)	7 (1,8)	7 (1,8)
Cooling system	l (gal US)	6,7 (1,8)	6,7 (1,8)
Hydraulic system	l (gal US)	28,5 (7,5)	28,5 (7,5)
Spraying emulsion	l (gal US)	-	-
Wiring			
Voltage	V	12	12
Battery capacity	Ah	77	77
Noise and vibration emissions			

1.3 Technical data

		ATR 23	ATR 26
		EU Stage V	
Measured sound pressure level A, L_{pA} at the operator's position (platform) *	dB	87	87
Uncertainty K_{pA} *	dB	2	2
Guaranteed sound power level A, L_{WA} **	dB	106	106
Highest weighted effective value of acceleration of vibrations transmitted to the whole body (platform) ***	m/s ² (ft/s ²)	<0,5 (<1,6)	<0,5 (<1,6)
Total value of acceleration of vibrations transmitted to hands (platform) ***	m/s ² (ft/s ²)	3 (9,8)	3 (9,8)
Optional equipment			
Additional lights Direction indicators Working lights Beacon Backup alarm Licence plate holder Central lifting point Additional left drive lever Arm rest Water tank lock Infrared Thermometer Compaction Measurement System (CMS) Traction control Edge cutter Fixed scrapers Tiltable scrapers FOPS roof (mounted on the ROPS) Canopy Seat heating Chamberized Certificate of Origin Rear-view mirror			

* measured according to EN 500-4

** measured according to DIRECTIVE 2000/14/EC

*** measured according to EN 1032+A1 while driving with vibration on gravel foundation

2 OPERATING MANUAL

2.1.1 Safety precautions during operation of the machine

Safety measures given in the individual chapters of the technical documentation supplied with the machine must be supplemented with safety precautions in the workplace in force within the respective country where the machine is used, with respect to organization of work, working process and personnel involved.

2.1.1.1 Before compacting works are started

- The building contractor (machine user) is liable to issue instructions for operators and maintenance workers that include requirements to provide for safe operation of the machine.
- Before the compacting works are started, he must verify:
 - utility lines
 - underground areas (direction, depth)
 - seepage or sudden escape of harmful substances
 - ground-bearing capacity, travel plane slope
 - other obstacles and specify work safety measures.

He must make the machine operator carrying out the earth works familiar with the above items.

- He must specify a technological procedure including a working process for the specific job that specifies among others:
 - measures for works under extraordinary conditions (works within protection zones, extreme slopes, etc.)
 - precautions for any natural disaster hazards
 - work performance requirements and observance of principles of health and safety at work
 - technical and organizational measures to ensure safety of employees, workplaces and surroundings.

He must make the machine operators provably familiar with the technological procedure.

2.1.1.2 Work in the dangerous area

Any damage to the utility lines must be immediately reported to their provider, and at the same time measures must be taken to prevent unauthorized persons from entering the dangerous area.

The worker is not allowed to work alone in a workplace where another worker is not in sight and within an ear shot who if necessary will be able to provide help or call for help unless another effective form of supervision or communication is ensured.

2.1 Main safety precautions

2.1.1.3 Ensurance of safety measures by the provider

- He must ensure that the machine is operated only under conditions and only for purposes it is technically capable of according to conditions specified by the manufacturer and respective standards.
- He must ensure that the machine is used only in such a way and in such a workplace where there is no risk of transmission of dangerous vibrations and damage to nearby facilities, etc.
- He must ensure a regular inspection of operation and technical condition, and regular machine maintenance in intervals according to the lubrication and maintenance instructions. If the technical condition of the machine does not meet requirements to such an extent that the machine endangers safety of operation, persons and property, or damages and impairs the environment, it must be put out of service until the defects are removed.
- He must specify who is allowed to carry out operation, maintenance and repairs of the machine as well as what activities can be carried out in such cases.
- Every person who drives the machine or performs maintenance and repairs of the machine must be familiarised with instructions stated in the operating manual of the machine.
- He must ensure that the fire extinguisher is checked on regular basis.
- He must ensure that the "Operating manual" is available at a designated location in the machine.
- He must ensure continuous supervision by an appointed person during machine operation on public roads and is liable in particular for releasing instructions to ensure health protection and work safety.
- He must ensure that dangerous substances (fuel, oils, coolant, etc.) must be removed from places of leakage according to their nature to avoid their adverse impact on the environment, safety of operation and human health.

2.1.1.4. Protective ROPS frame

When the ROPS protection frame is used:

- the machine frame must not be damaged (broken, bent, etc.) in the connection point
- the protective ROPS frame itself must not show corrosion, cracks or breaks
- the protective ROPS frame must not be loose during operation of the machine
- all bolted connections must meet requirements of the specification and must be tightened to the specified torque
- bolts must not be damaged, distorted and must not show rust marks.
- Additional modifications must not be carried out on the protective ROPS frame without the approval of the manufacturer because they can result in decrease of its strength (e.g. holes, welding, etc.).
- The machine weight must not exceed the maximum permissible weight according to the protective ROPS frame.

2.1.2 Requirements for the qualification of machine operators

Only a person having been trained according to ISO 7130 and other local and national instructions and standards specified for operators of this group of machines, is allowed to operate the machine.

2.1 Main safety precautions

2.1.3 Driver's obligations

- Before starting operation of the machine, the machine operator is obliged to get familiar with instructions stated in the documentation supplied together with the machine, especially with safety precautions, and strictly observe the instructions. This also applies to personnel assigned to maintain, adjust and repair the machine. (In case you do not understand some parts of the manuals, contact the nearest dealer or the manufacturer.)
- He may drive the machine only if he is fully familiarized with all functions of the machine and working and operating elements and knows precisely how to operate the machine.
- The driver is obliged to follow the safety signs located on the machine and keep them legible.
- Before starting the work, the operator must get familiar with the workplace environment, i.e. with obstructions, slopes, utility line system and with necessary types of workplace protections with respect to the surroundings (noise, vibration, etc.).
- The operator while working with the machine must be fastened with the safety belt.
- The safety belt and its brackets must not be damaged.
- When there is a risk to health, human life, property, failures, during hardware accidents, or there are symptoms of such risks during operation, the operator must stop his work and secure the machine against undesired starting, communicate this to a responsible worker and to a possible extent notify all the persons exposed to such hazard.
- Before starting operation of the machine, the operator is obliged to get familiar with the records and operating deviations found out during the previous work shift.
- Before starting the work, the driver is obliged to inspect the machine and accessories and to check control elements and communication and safety equipment for functioning according to the manual. If he finds a defect that might endanger the safety of work and is not able to repair it, then he must not put the machine into operation and must report the defect to a responsible worker.
- If the operator finds a defect during operation, he must immediately stop the machine and secure it safely against undesirable starting.
- During operation the operator must watch the machine run and record any detected defects into the operation logbook.
- The operator must maintain an operation logbook which is meant for records of machine acceptances and take-overs carried out between operators, of defects and repairs done during operation and keeping files of serious events during the work shift.
- Before putting the machine into operation, he must check the brakes and steering for functioning.
- Before the engine is put into operation, both travel controls must be in the parking position (P); no persons are allowed to stay within dangerous reach of the machine.
- The driver must always notify the others each time the machine is put into operation with the help of a sound or light signal before starting the engine of the machine.
- After a warning alarm, the operator may put the machine into operation only when all workers have left the endangered area. During operation of the machine it is necessary to follow safety instructions and not to carry out any activity that might endanger the work safety; the operator must be fully engaged in driving the machine. He must always sit on the seat while driving the machine.
- The driver must comply with technological procedures of works or instructions of a responsible worker.
- When rolling (traversing) the machine within the workplace, he must adapt the driving speed to terrain conditions, the work performed and weather conditions. He must watch continuously the clearance to avoid collision with any obstruction.
- If the operator finishes or interrupts operation of the machine and leaves the machine, he must carry out safety measures against unauthorized use of the machine and undesired start up. The operator must remove the key from the ignition box, lock the cab or dashboard cover and disconnect the electrical installation using the disconnecter.
- When the operation is completed, park the machine at a suitable parking place (flat, bearing surface) so as not to endanger stability of the machine; the machine must not interfere with traffic roads, must not be exposed to falling objects (rocks), and must be protected against any natural disaster of another kind (floods, landslides, etc.).
- When parking the machine on roads, the measures according to road traffic regulations shall be taken. The machine must be marked properly.
- After finishing the work with the machine, all of the defects, damages to the machine and any repairs made must be recorded in the operation logbook. When the operators take turns, one operator is obliged to report any identified facts to the other operator.
- The operator must use personal protective equipment – work clothes, work shoes, protective helmet and protective goggles.
- He must equip the machine with accessories and equipment as prescribed.
- He must keep the operator's stand, foot rests and walkways clean.
- Keep the machine free of oil contaminants and inflammable materials.
- If the machine could come into contact with high voltage, the following principles must be observed:
 - try to leave the hazardous zone with the machine;
 - do not leave the operator's stand;
 - warn the others to keep off and not touch the machine.

2.1.4 Forbidden activities – safety and guarantee

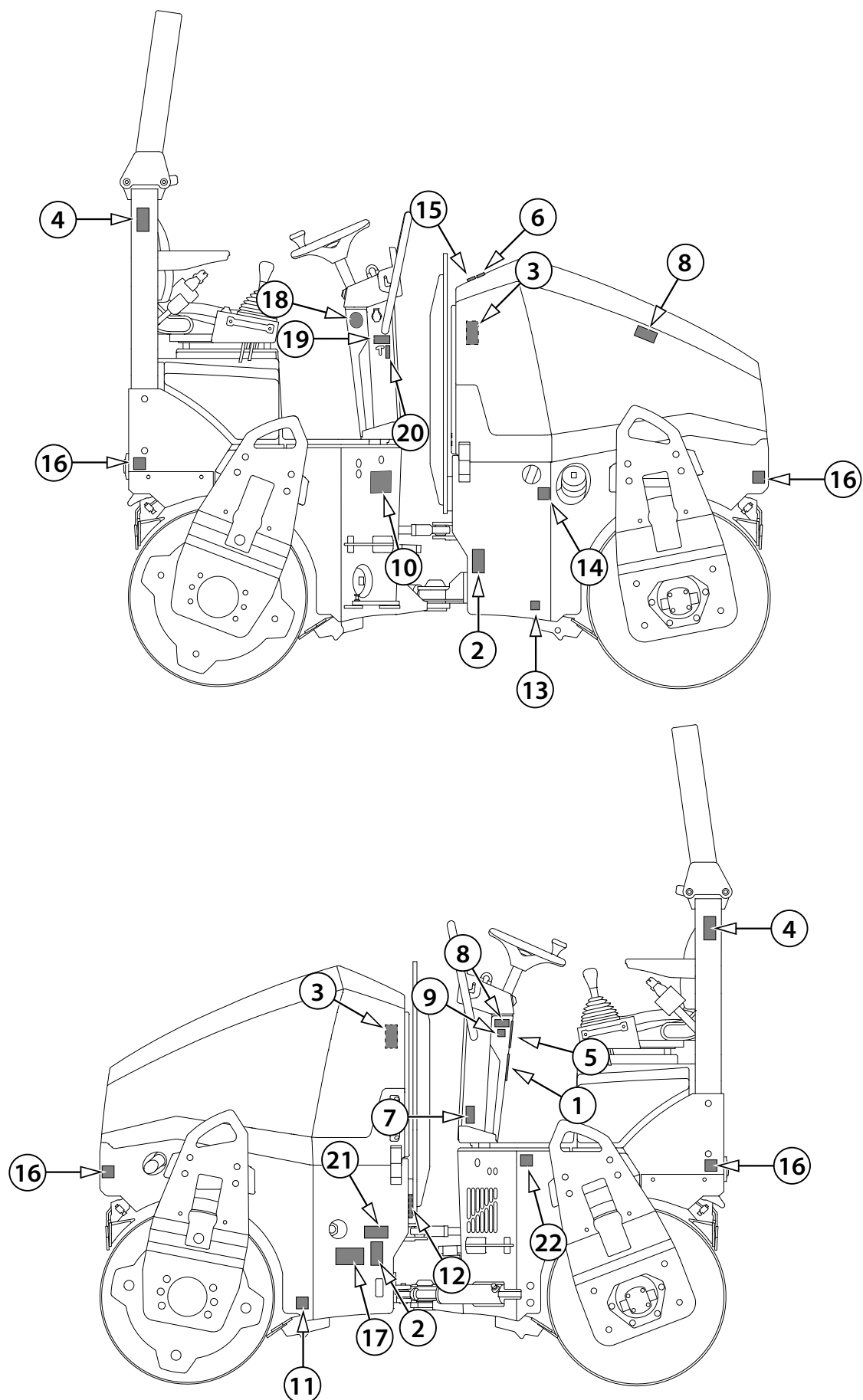
The following is forbidden

- Using the machine in case of an evident defect of the machine.
- Using the machine when any of the operating fluid levels is low.
- To repair the engine without authorization – except common changes of operating fluids and filters, only an authorized service organization is allowed to intervene in the engine, including the peripheral components of the engine (for example, the alternator, the starter, the thermostat, the electrical installation of the engine).
- Increasing and decreasing the engine speed rapidly; you could damage the engine.
- Using the emergency brake for turning off the engine during normal operation of the machine.
- Operate the machine in potentially explosive atmospheres (ATEX) and underground areas.
- Using the machine after ingestion of alcoholic beverages or drugs.
- Using the machine if its operation might endanger its technical condition, safety (life, health) of persons, facilities or objects, or road traffic and its continuity.
- Putting the machine into operation and using the machine when other persons are within its danger zone – the exception is a training of a driver by an instructor.
- Putting the machine into operation and using the machine when a safety device (emergency brake, hydraulic locks, etc.) has been removed or damaged.
- Travelling and compacting in such slopes where the machine stability would be broken (overturning). The stated machine static stability is reduced by dynamic effects of the drive.
- Travelling and compacting in such gradients of slopes where there is a risk of soil breaking off (dropping) under the machine or of loss of adhesion and of uncontrolled slip.
- Controlling the machine in some other way than stated in the operating manual.
- Travelling and compacting with vibration according to the bearing capacity of the subsoil in such a distance from the slope edge or trenches where there is a risk of landslide or shoulder breaking off (dropping) together with the machine.
- Travelling and compacting with vibration in such a distance from walls, cuts and slopes where there is a risk of landslide and the machine could be covered up with soil.
- Compacting with vibration in such a distance from buildings or facilities and equipment within which there is a risk of damage due to transmission of vibration.
- Moving and transporting persons on the machine.
- Working with the machine if the operator's stand is not properly attached.
- Working with the machine when the bonnet, cab or platform is lifted off.
- Working with the machine if there are other machines or means of transport in its danger zone, except those that operate in mutual cooperation with the machine.
- Working with the machine at a place that is not seen from the operator's stand and where hazard to people or property could occur unless the occupational safety is ensured through some other way, e.g. by a duly instructed signalling person.
- Working with the machine in a protected zone of electric lines or substations.
- Crossing electric cables if they are not properly protected against mechanical damage.
- Working with the machine in reduced visibility or at night unless the machine's working area and the workplace are illuminated sufficiently.
- Leaving the seat of the machine operator when the machine is running.
- Getting in or off on the run, jumping down from the machine.
- Sitting on the railing or external parts of the machine during a drive.
- Leaving the machine unattended – moving away from the machine without having prevented its misuse.
- Disabling safety, protective or locking systems or altering their parameters.
- Using a machine from which oil, fuel, coolant or other operating fluid is leaking.
- Starting the engine in a different way than given in the operating manual.
- Placing other items (tools, accessories) than items for personal use on the operator's stand.
- Placing materials or other items on the machine.
- Removing dirt while the machine is running.
- Performing maintenance, cleaning or repairs with the machine not secured against spontaneous movement or accidental start, and if a person can come in contact with moving parts of the machine.
- Touching moving parts of the machine with the human body or items and tools held in hands.
- Smoking or handling open fire when checking or pumping fuels, replacing and refilling oils, lubricating the machine and inspecting the battery and refilling the battery.
- Conveying rags saturated with inflammable materials and inflammable liquids in loose vessels on the machine (in the engine compartment).
- Leave the engine running in enclosed, unventilated areas. Exhaust fumes are dangerous to life.
- Performing modifications on the machine without the prior consent of the manufacturer.
- Travelling with the seat belt not fastened.
- Moving electrical conductors.
- Using other than original spare parts.
- Intervening in electrical and electronic units in any manner.
- Using the pressure washing near the control unit of the machine.
- Filling the hydraulic circuit during the guarantee period in a different way than using the hydraulic unit.
- Working long-term in the vibro stroke mode!



Non-observance of the above provisions can impact on the assessment of a complaint and effectiveness of the engine guarantee period.

2.1 Main safety precautions



588005D

2.1.5 Safety notices and signs applied on the machine

- 1 Read the operating manual



2946bz

Get perfectly familiar with the machine operation and maintenance according to the operating manual!

- 2 Pinch points



3865

Maintain a safe distance from the machine; there is a danger of squeezing by the machine between the front and rear frames.

- 3 Risk of injury



3866

There is a risk of injury. Do not touch rotating parts while the engine is running. There is a risk of burns. Do not touch hot parts of the machine unless you make sure that they are sufficiently cold.

- 4 Risk of injury



3864bz

There is a risk of fatal injury. Do not operate the machine when the ROPS is lowered.

- 5 Using the parking and emergency brakes



3867bz

Use the parking brake only when the machine is stopped. Use the emergency brake only for stopping the machine in emergency.

2.1 Main safety precautions

6 Safety belt



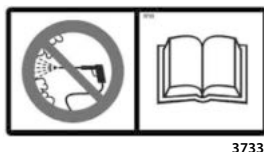
Fasten the safety belt before the machine starts moving.

7. Keep calm and adjust



Turn off the engine and remove the key from the ignition box before performing maintenance or repairs.

8 Washing the machine with water



Dangerous situation. Prevent water from entering electric and electronic parts of the machine as it may result in damage of the equipment and personal injury. Read the operation manual!

9 Hearing protection



Dangerous noise level! Use hearing protection.

10 Guaranteed sound power level



- 11 Hydraulic oil drain plug



- 12 Engine oil drain plug



- 13 Fuel drain plug



- 14 Fuelling



- 15 Lifting point



When lifting, suspend the machine only in these holes.

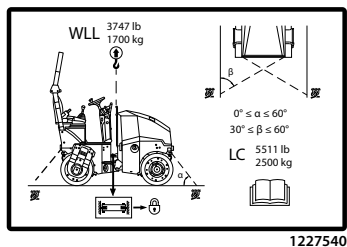
2.1 Main safety precautions

- 16 Fastening hole



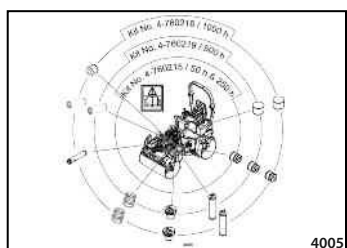
When transporting, fasten the machine only in these holes.

- 17 Suspension diagram

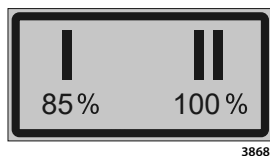


To lift the machine, use slings with a sufficient lifting capacity according to chapter Loading the machine. Before hanging, lock the articulation of the machine.

- 18 Set of filters



- 19 Engine speed adjustment in per cents



- 20 Engine speed



- 22 Emulsion sprinkling tank



2.1.6 Hand signals

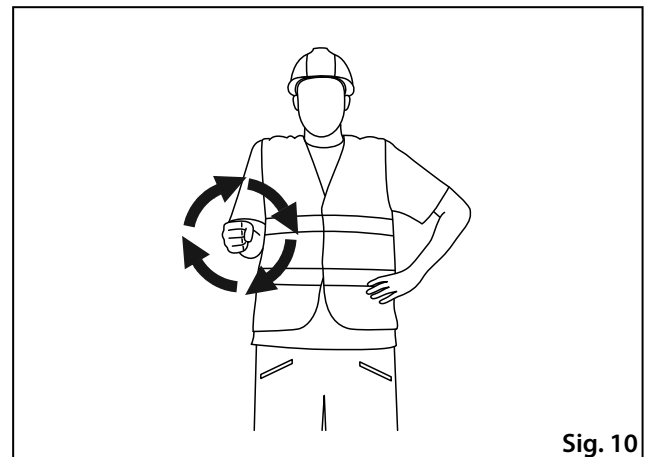
Signals given by an assistant operator if the operator cannot see the travelling or working area or work devices of the machine.

The following principles must be observed:

- For communication purposes, only a limited number of signals must be used.
- The signals must be clearly distinguishable to prevent any misunderstanding.
- Hand signals can only be used when ambient conditions allow clear communication between persons.
- Hand signals must be as similar as possible to intuitive movements.
- Single-handed signals can be done with any hand.

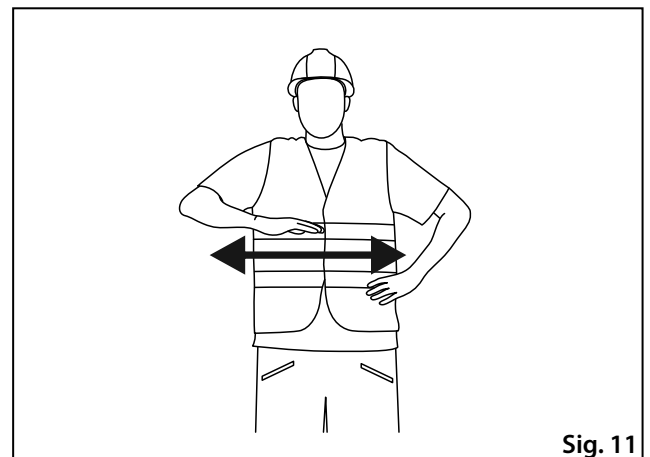
SIGNALS FOR GENERAL COMMANDS

Engine start



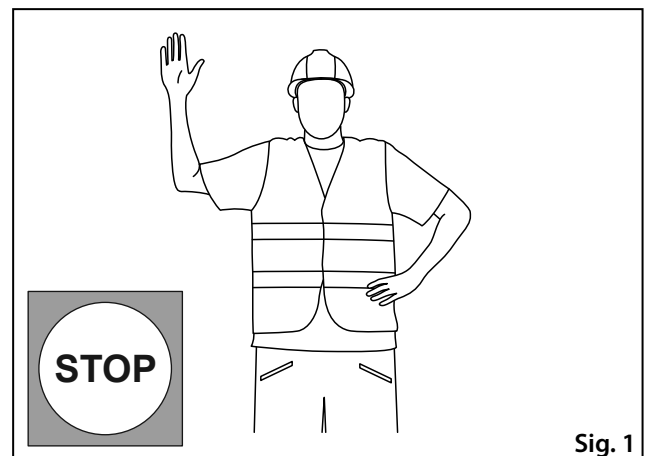
Sig. 10

Engine OFF



Sig. 11

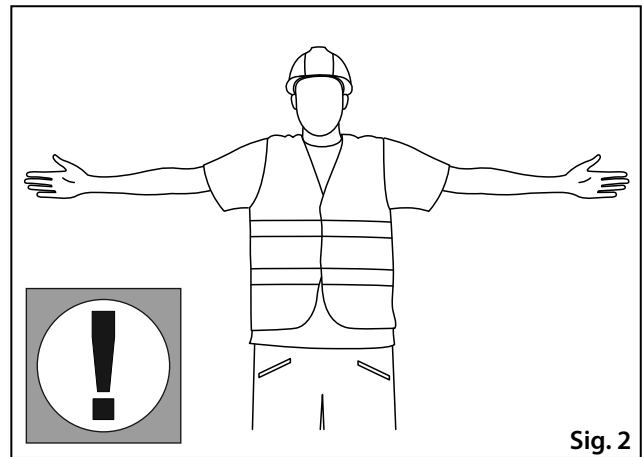
Stop



Sig. 1

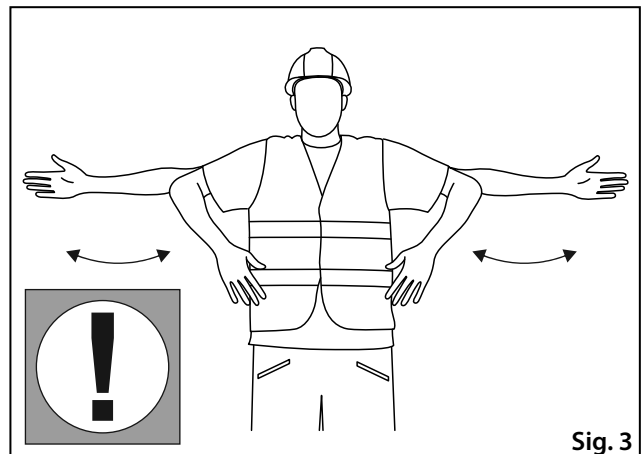
2.1 Main safety precautions

Watch out!



Sig. 2

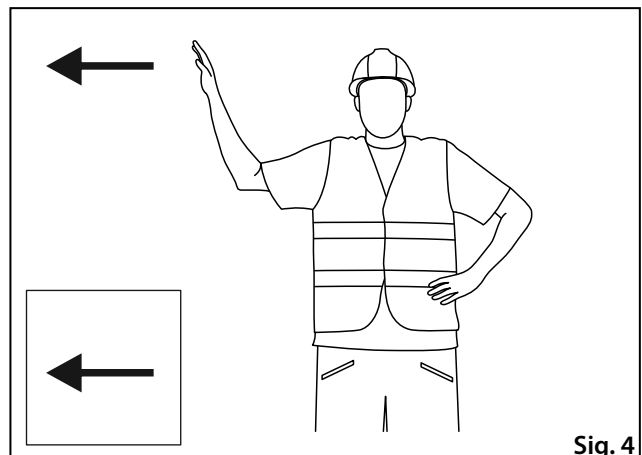
Watch out, danger!



Sig. 3

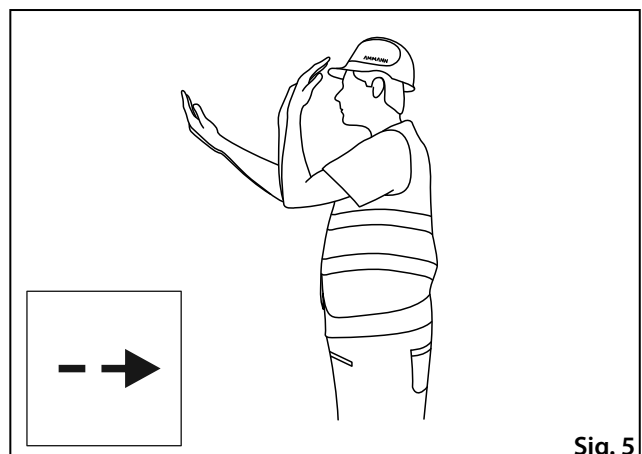
SIGNALS FOR DRIVE

Travel



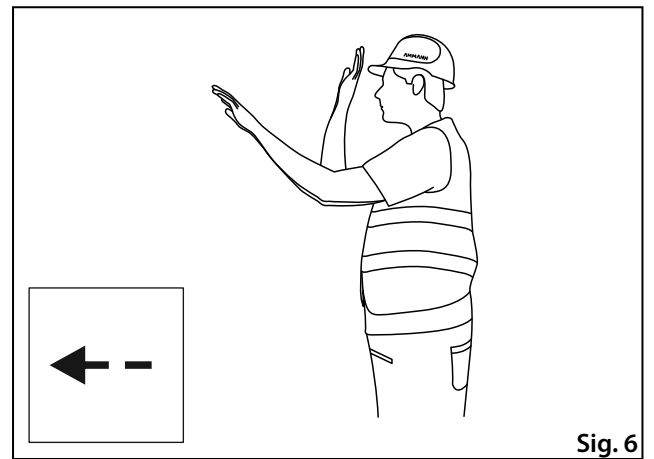
Sig. 4

Slow forward travel – towards me

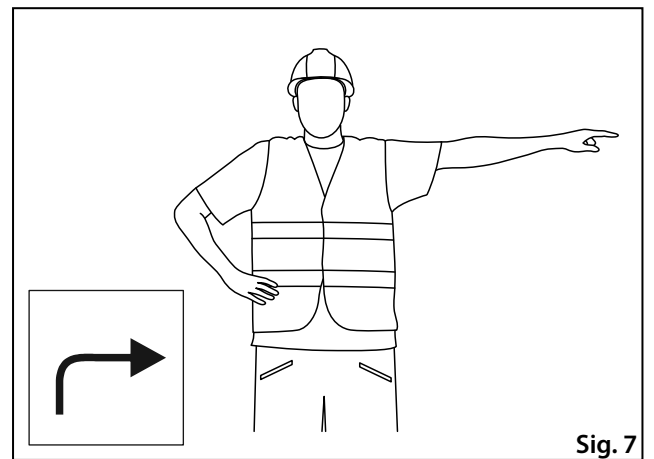


Sig. 5

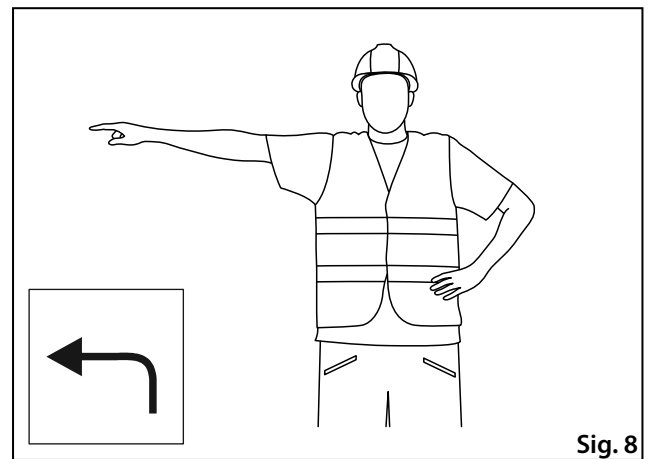
Slow reverse travel – away from me



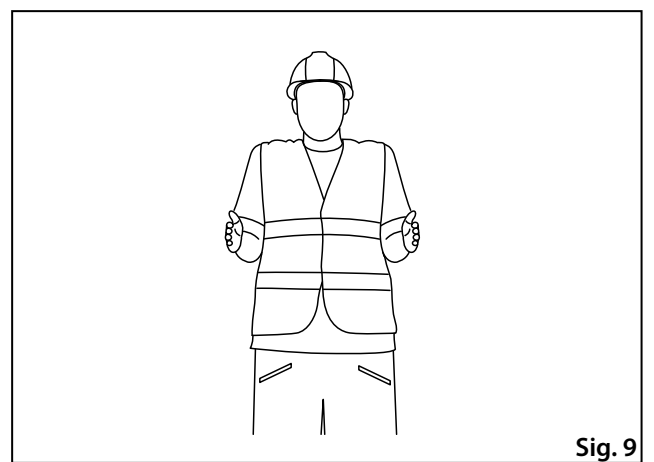
Drive to the right



Drive to the left



Short distance travel



2.2 Environmental and hygiene principles

2.2.1 Hygiene principles



When operating and storing the machines, the user is obliged to observe general principles of health and environmental protection, and laws and regulations relating to the given points at issue within the territory where the machine is used.

- Petroleum products, cooling system fluids, battery fluids and coating compounds including thinners are substances harmful to health. Workers coming into contact with the above products during operation or maintenance of the machine are obliged to follow general principles of their own health protection and comply with safety and hygienic manuals made by manufacturers of the products.

In particular we draw your attention to the following:

- protect your eyes and skin while working with the batteries
- protect your skin while handling petroleum products, coating compounds and coolants
- wash your hands properly after finishing the work and before eating, treat your hands with a suitable reparation cream
- when handling cooling systems, follow instructions given in the manuals supplied with the machine.
- Always store petroleum products, cooling system fluids, battery cartridges and coating compounds including organic thinners, and also cleaners and preserving agents in original and properly labelled containers. These materials are not allowed to be stored in unlabelled bottles or in any other containers considering the possible risk of confusion. Possible confusion with foodstuffs or beverages is very dangerous.
- If by accident the skin, eyes or mucous membrane is stained or if you breathe in the vapours of such products, apply immediately the principles of the first aid. In case of accidental ingestion of these products, immediately seek medical help.
- When working with a machine that is not provided with a cab or when the cab windows are open, always use ear protectors of suitable type and version.

2.2.2 Environmental principles

- Discarded operating fluids of individual systems of the machine and also some of its parts become hazardous wastes with dangerous properties for the environment.

This category of waste products includes in particular:

- organic and synthetic lubricating materials, oils and fuels;
- coolants;
- battery fluids and batteries;
- cleaning and preservative agents;
- all dismantled filters and filter cartridges,
- all used and discarded hydraulic or fuel hoses, rubber-metal elements and other parts of the machine contaminated by the above mentioned products.



It is necessary to treat the above mentioned materials and parts after they have been discarded in accordance with relevant national regulations applicable to environmental and health protection.

2.3 Preservation and storage

2.3.1 Short-term preservation and storage for 1–2 months

Wash and clean the entire machine carefully. Before parking the machine for preservation and storage, run the engine to warm it up to its operating temperature. Park the machine on a solid and flat surface at a safe place with no risk of natural disaster (floods, landslides, fire, etc.) for the machine.

In addition:

- repair paints where damaged.
- lubricate all lubrication points
- confirm that water fillings are drained
- check that the coolant has the required antifreeze properties
- check that the batteries are charged and/or recharge them if necessary
- lubricate chromed surfaces of piston rods with preservative grease
- We recommend you to protect the machine against corrosion with a preservative coating (applied by spraying), especially where corrosion can occur.

2.3.2 Preservation and storage of the machine for a period over 2 months

For machine shut-down, the same principles are applicable as for the short-term preservation.

In addition it is recommended to:

- remove the batteries, check for condition and store them in a cool and dry room (charge the batteries regularly)
- support the drum frame so that the shock-absorbing system shows minimal sag
- protect the rubber elements by coating with special preservative agent
- cover the suction and exhaust pipe of the engine with double PE foil and tighten it carefully with sealing tape
- spray a special liquid on the headlights, external rear-view mirrors and other elements of the external electrical installation and wrap in PE foil to protect them
- preserve the engine according to the manufacturer's manual – mark visibly that the engine is preserved.

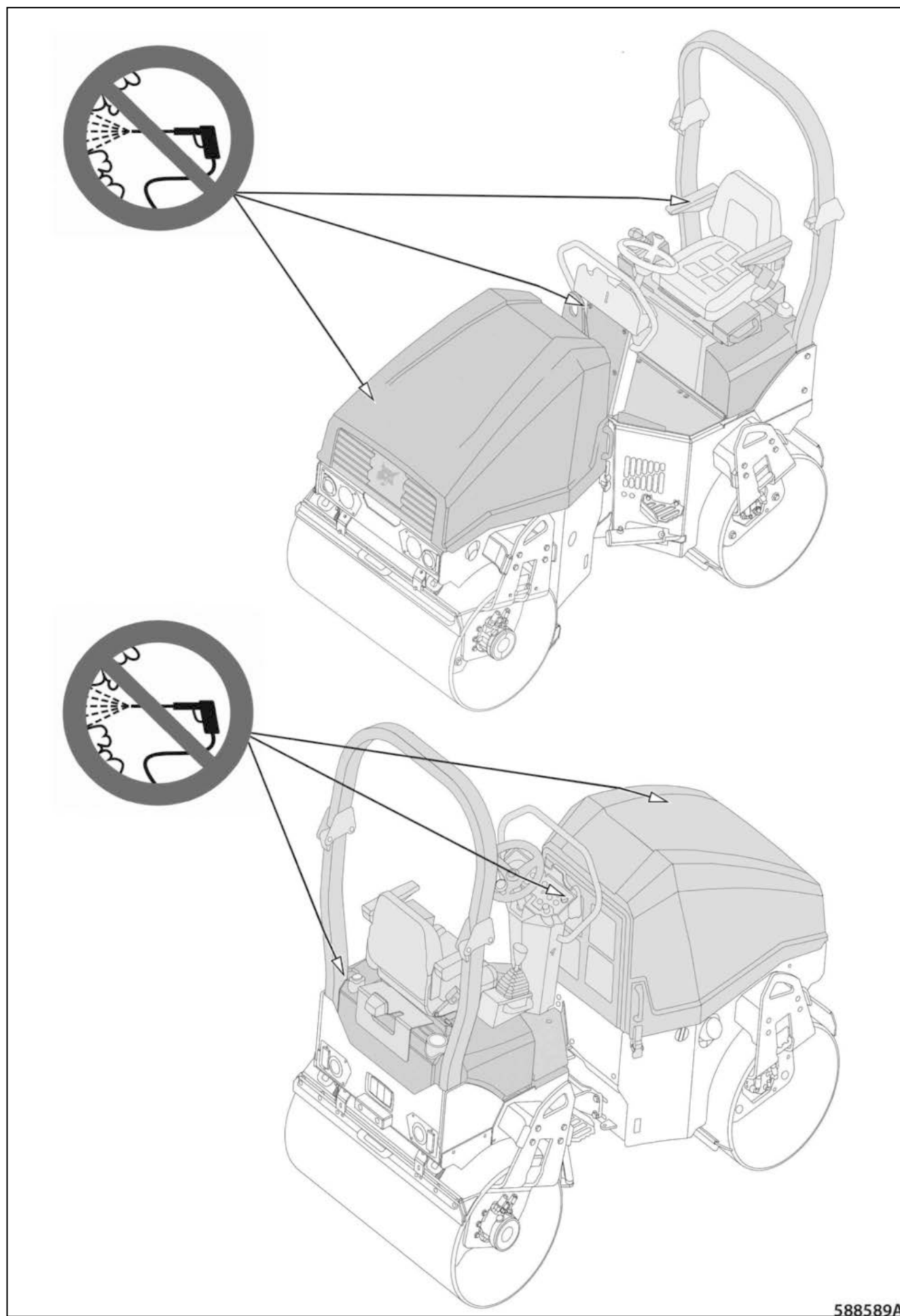


After 6 months, we recommend you to inspect the condition of preservation and renew if required.

Never start the engine during storage!

When the machine is stored under field conditions, check that the parking place is not exposed to danger of flooding due to floods and that there is no other type of danger in this area (landslip etc.)!

2.3 Preservation and storage



2.3.3 Machine depreservation

- Check all parts of the machine for damage during storage and for missing parts.



If the machine has been preserved, remove the preservative agents as follows:

Wash off the preservative agents using a high-pressure stream of hot water with common degreasers:

- Wash the machine while observing environmental principles.
- **Caution! Do not use a high-pressure stream to wash the edge cutter and the highlighted parts of the machine as shown in Fig. 588589A, as this could seriously damage the machine.**
- Prevent water from entering the air filter, electrical and electronic parts of the machine.
- Do not use a high-pressure stream near the control unit!
- Use a high-pressure stream at a maximum angle of 90 degrees downwards.

Remove the preservation and wash the machine in places with intercepting sumps to catch the water and de-preservation agents.

Remove the preservation according to the manufacturer's manual.



Before putting the machine into operation, check the operating fluids.

2.4 Machine disposal after its service life

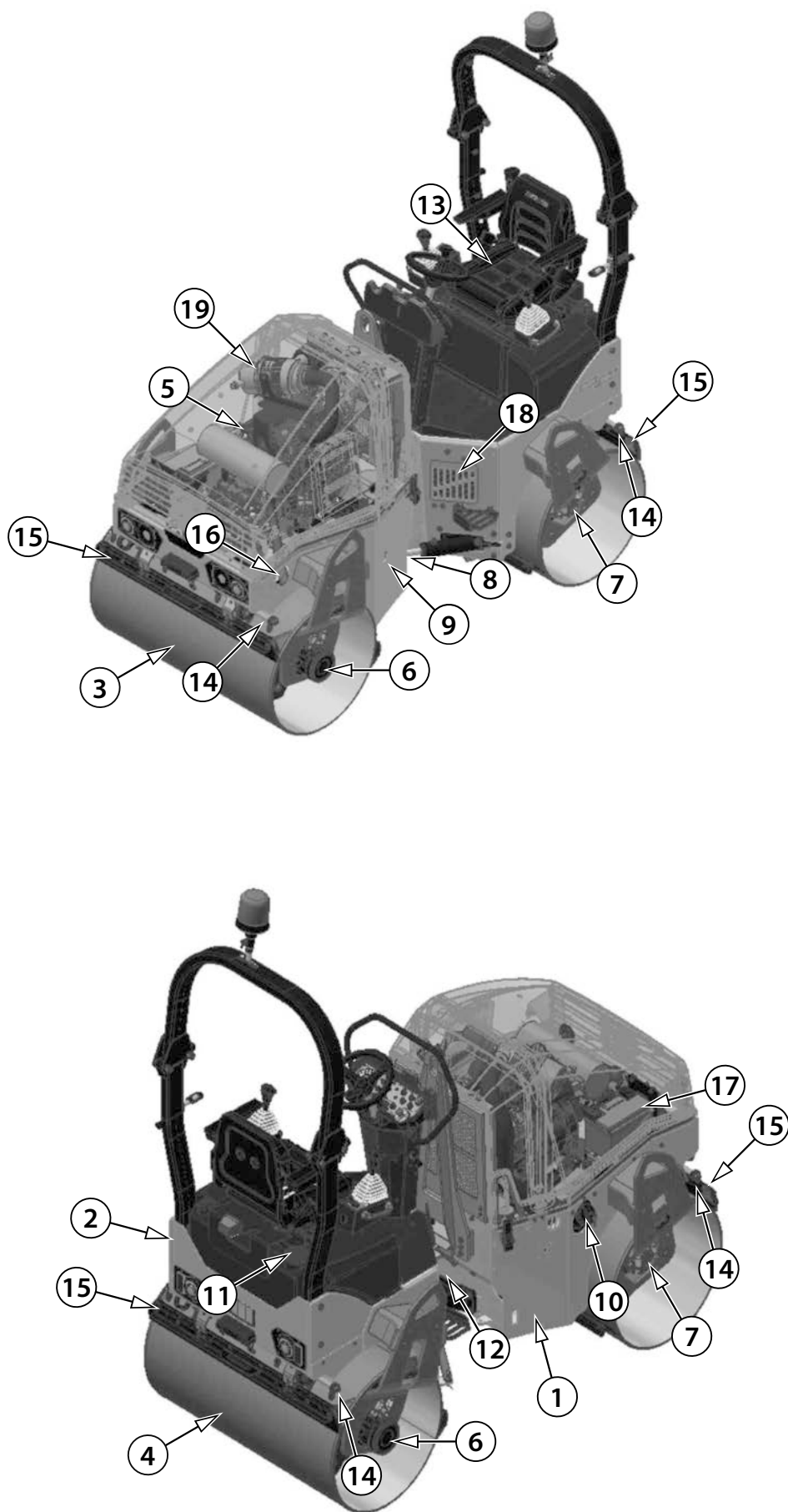
When disposing the machine following its service life, the user is obliged to follow national waste and environmental regulations and acts. In the above cases, we recommend you to always contact:

- specialized companies with a respective authorization for these operations
- the machine manufacturer or accredited contracting service organizations authorized by the manufacturer.



The machine manufacturer Bobcat shall not be liable for damage to the health of users or environmental damage caused by non-compliance with the above mentioned rules.

2.5 Machine description

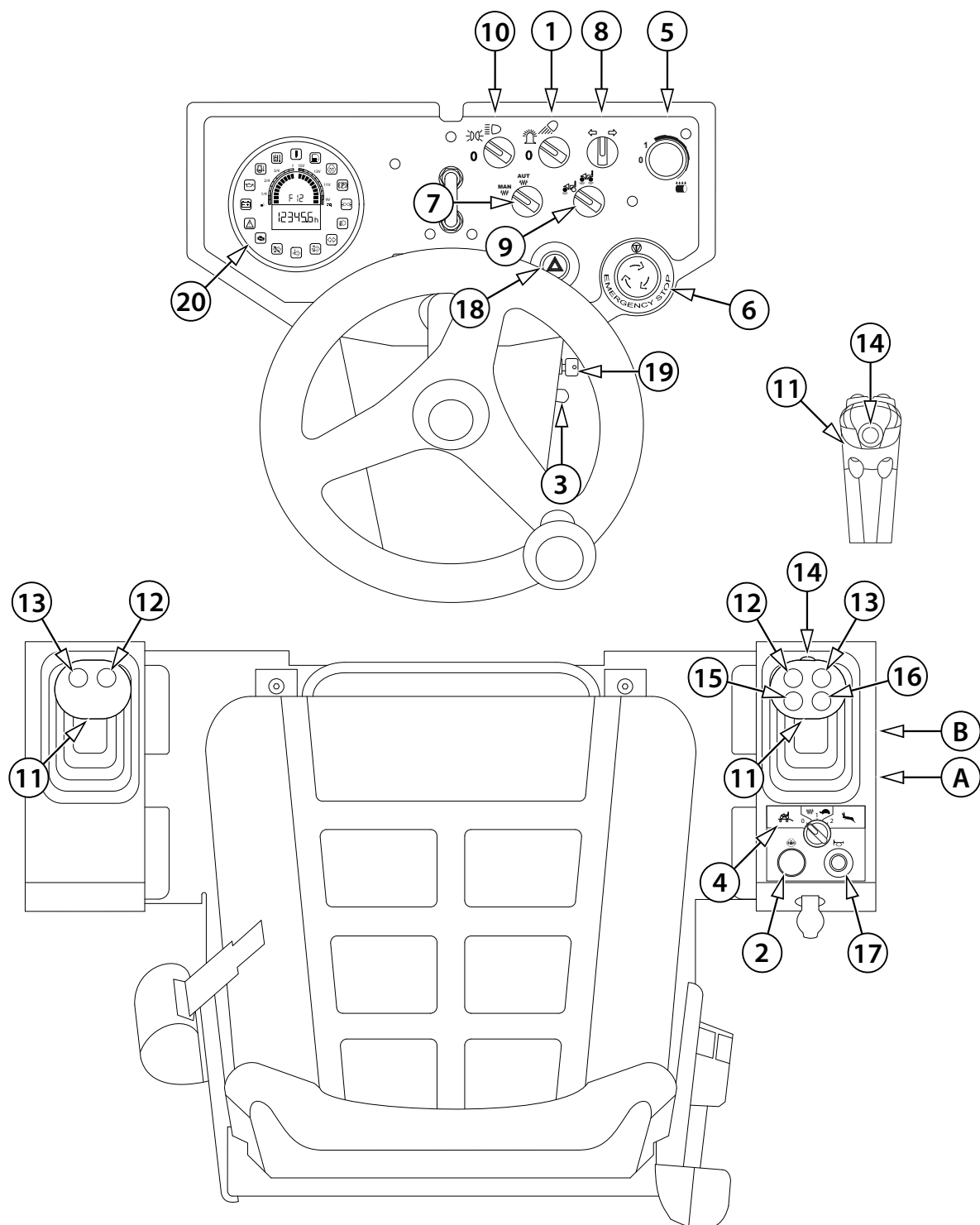


593058

Legend:

- 1 - Front frame
- 2 - Rear frame
- 3 - Front drum
- 4 - Rear drum
- 5 - Engine
- 6 - Travel hydraulic motor
- 7 - Vibration hydraulic motor
- 8 - Steering joint
- 9 - Hydraulic oil level indicator
- 10 - Fuel tank
- 11 - Sprinkling tank
- 12 - Sprinkling filter
- 13 - Operator's stand
- 14 - Drum sprinkling
- 15 - Drum scraper
- 16 - Exhaust pipe
- 17 - Battery
- 18 - Hydraulic oil cooler
- 19 - Air filter

2.6 Controls and checking instruments



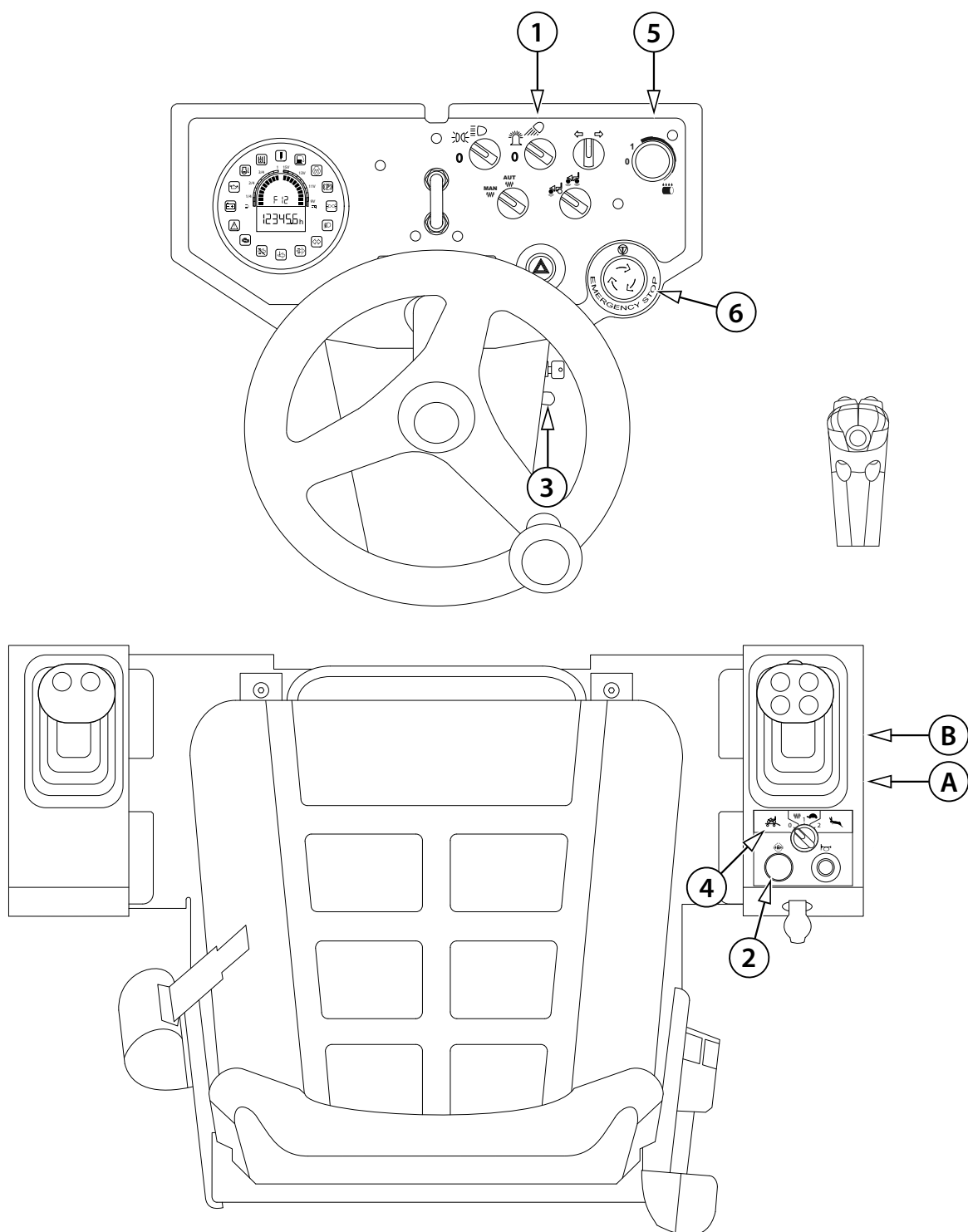
593001B

2.6.1 Dashboard and control panels

Legend:

- A - Brake test button
- B - Calibration button
- 1 - Beacon and rear light change-over switch
- 2 - Differential lock button
- 3 - Engine speed selector
- 4 - Travel mode switch
- 5 - Sprinkling potentiometer
- 6 - Emergency brake button
- 7 - Vibration mode selector switch (manual mode / automatic mode)
- 8 - Turn indicators switch
- 9 - Vibrating drum selector switch
- 10 - Lights switch (outline lights / front lights)
- 11 - Travel control
- 12 - Vibration switch
- 13 - Sprinkling switch
- 14 - Edge cutter sprinkling switch
- 15 - Edge cutter button – up
- 16 - Edge cutter button – down
- 17 - Horn switch
- 18 - Warning lights
- 19 - Ignition box
- 20 - Display

2.6 Controls and checking instruments



593002B

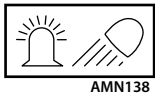
Brake test button (A)

Used to check the correct brake function.

Calibration button (B)

Used to calibrate functions:

- start ramp HARD / SOFT
- activation of the left travel lever
- infra thermometer setting °C / °F



Beacon and rear light change-over switch (1)

- To the gear 1: The beacon is ON.

It is possible that the machine is equipped with a beacon but the corresponding change-over switch is missing. In such a case, the beacon will start in continuous operation as soon as the ignition key is set to the position II.



Differential lock button (2)

It is used for turning on the differential lock.

The differential lock prevents the drum from slipping when crossing a difficult terrain.



Turn the differential lock off after the difficult ground has been overcome!

Engine speed control (3)

The control setting allows you to better adjust the speed and the vibration power to the given soil conditions.

Idle speed: Set the control to the first position.

Small working speed: Set the control to the position I (85%).

Big working speed: Set the control to the position II (100%).

Small working speed:

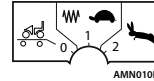
Frequency I

- 85% vibration capacity
- 85% travel speed (depending on the transport and working speed change-over switch)
- 85% engine speed

Big working speed:

Frequency II

- 100% vibration capacity
- 100% travel speed (depending on the transport and working speed change-over switch)
- 100% engine speed



Travel mode switch (4)

Loading mode (0)

- Limited travel speed.
- Activated differential lock.
- Blocked working functions of the machine (vibration).

Working mode (1)

- Machine working speed (7 km/h).
- Option to activate the differential lock for the time necessary.
- Option to activate the working functions of the machine (vibration).

Transport mode (2)

- Machine transport speed (10 km/h).
- Deactivated differential lock.
- Blocked working functions of the machine (vibration).



Sprinkling potentiometer (5)

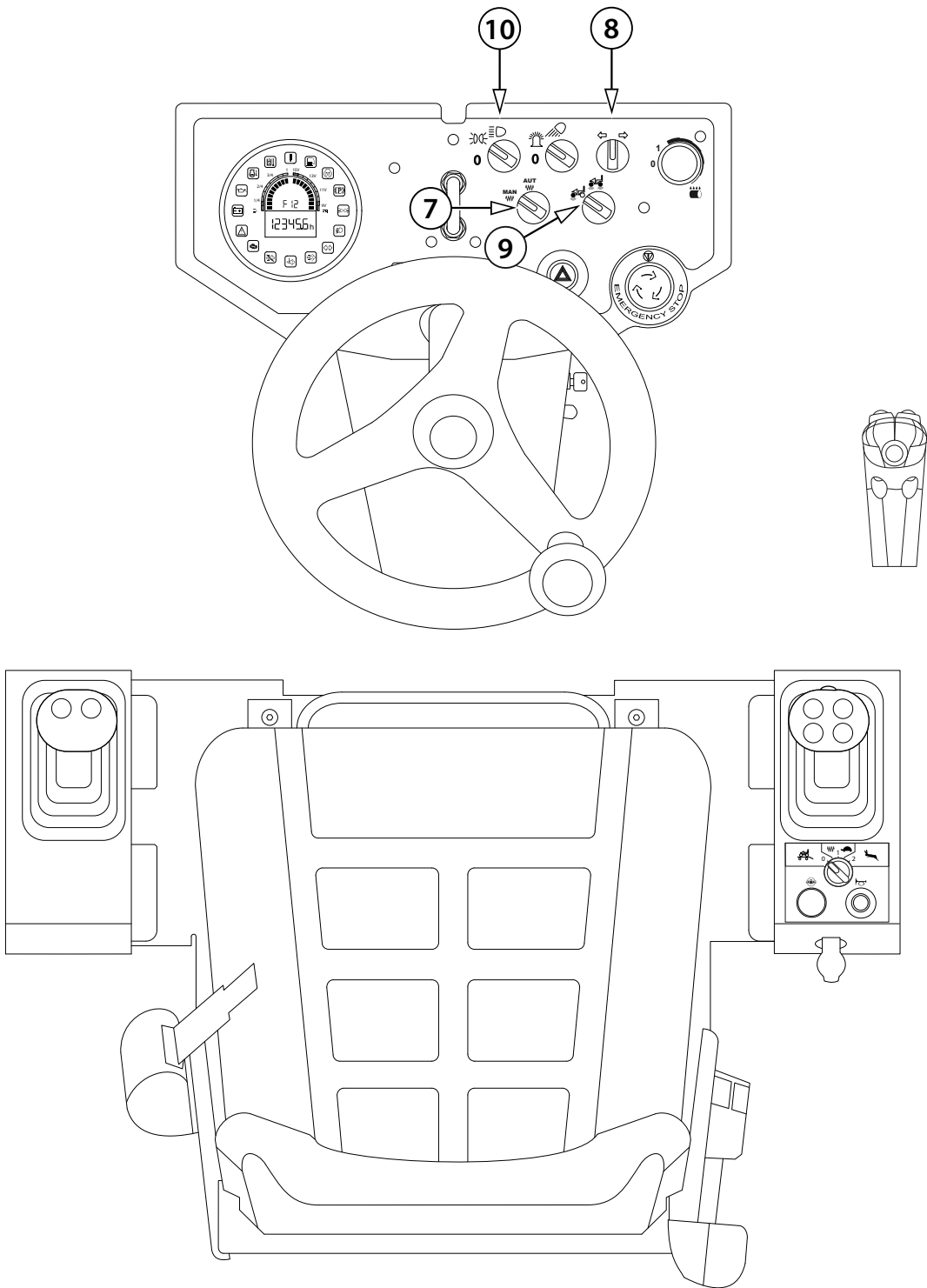
OFF in the position "0". Turn the sprinkling potentiometer from the position "1" to the position "MIN" to smoothly control the sprinkling intensity of the drums.



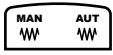
Emergency brake button (6)

Pressing the button activates the emergency brake of the machine. The machine stops, the engine shuts down. After activating the emergency brake button the indicator lamps for battery charging (22), engine lubrication (23), parking brake (29) and emergency stop (26) are shown on the display.

2.6 Controls and checking instruments



593003C



3726G

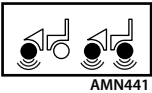
Vibration mode selector switch (manual mode / automatic mode) (7)

- Manual vibration mode – vibration can be switched on when the machine is stationary or moving. Drum sprinkling – vibration can be switched on when the machine is stationary or moving.
- Automatic vibration mode – vibration is automatically switched on when the machine starts moving and automatically switched off when the machine stops. Automatic activation of drum sprinkling when the machine starts moving and automatic deactivation of drum sprinkling when the machine stops.



3726CH

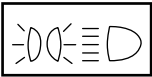
Direction lights switch (8)



AMN441

Vibrating drum selector switch (9)

- front drum
- front and rear drum

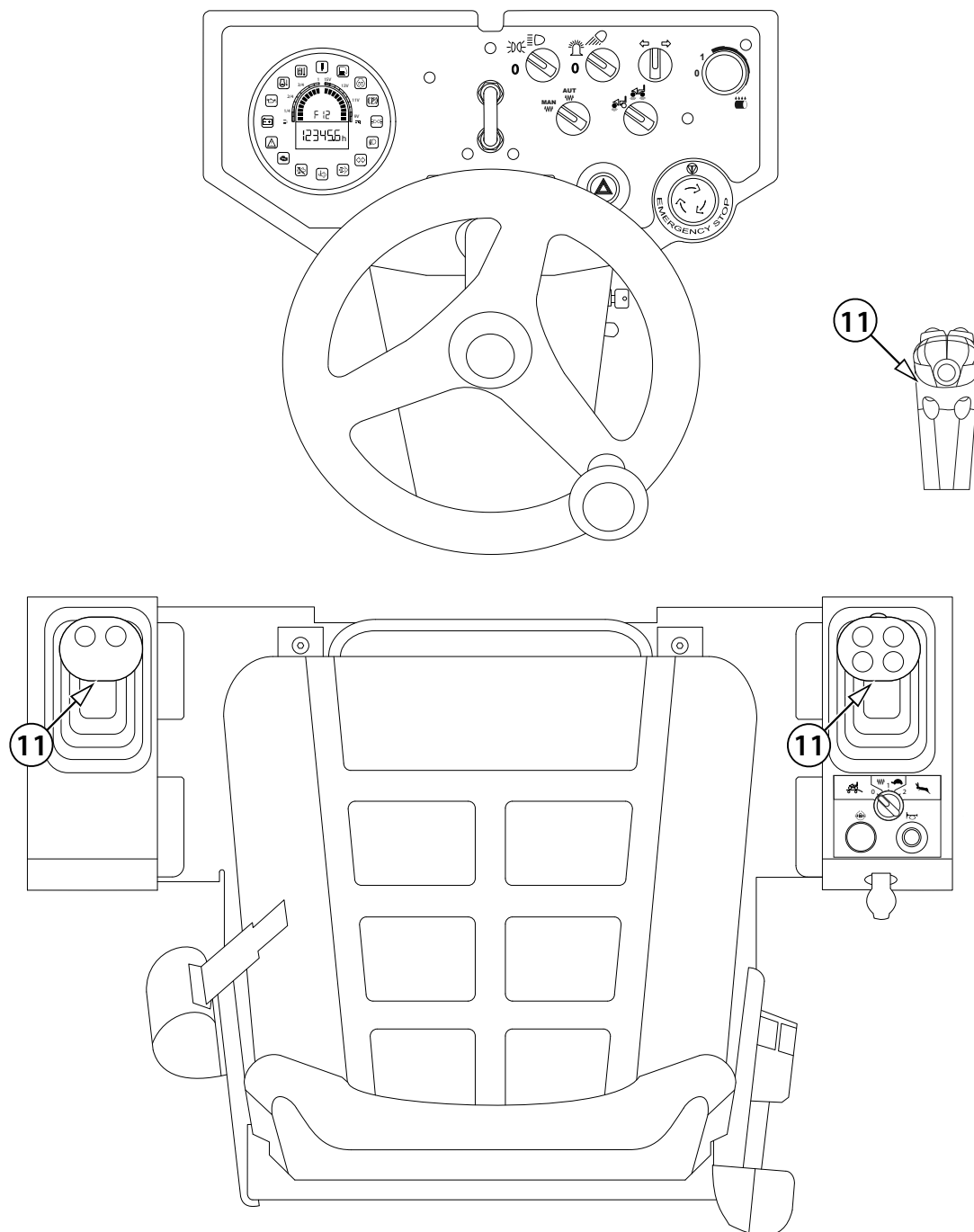


AMN139

Lights switch (parking lights / headlamps) (10)

- parking lights
- headlamps

2.6 Controls and checking instruments



593A003C

Travel control – right (standard) (11)

The travel control is used to set the engine speed, the parking brake, forward/reverse direction and the travel speed of the machine. Direction and speed of machine travel is controlled by shifting the control from zero position (0) forward or backward. The travel speed corresponds to the displacement of the travel control at the set speed gear. The travel control is fixed in the set position except for the zero position (0).

The travel control can activate the so-called panic response (Chapter 2.7.2).

Shifting the control to the neutral position (N) stops the machine – the parking brake is not engaged!



If you leave the travel lever in the neutral position (N), it is possible that the machine will move from the slope due to leakages of the hydraulic system.

The parking brake position (P) is indicated by lighting up of the parking brake indicator lamp.

The travel control is fitted with vibration, drum sprinkling, edge cutter (up/down) and edge cutter sprinkling switches.

- P – Parking brake – parking brake of the machine enabled
- N – Neutral – the machine is not braked
- 0 – Zero position
- F – Forward travel
- R – Reverse travel

Travel control – left (optional)

The travel control is used to set the engine speed, the parking brake, forward/reverse direction and the travel speed of the machine. Direction and speed of machine travel is controlled by shifting the control from zero position (0) forward or backward. The travel speed corresponds to the displacement of the travel control at the set speed gear. The travel control is fixed in the set position except for the zero position (0).

The travel control can activate the so-called panic response (Chapter 2.7.2).

Shifting the control to the neutral position (N) stops the machine – the parking brake is not engaged!



If you leave the travel lever in the neutral position (N), it is possible that the machine will move from the slope due to leakages of the hydraulic system.

The parking brake position (P) is indicated by lighting up of the parking brake indicator lamp.

The travel control is fitted with vibration and drum sprinkling.

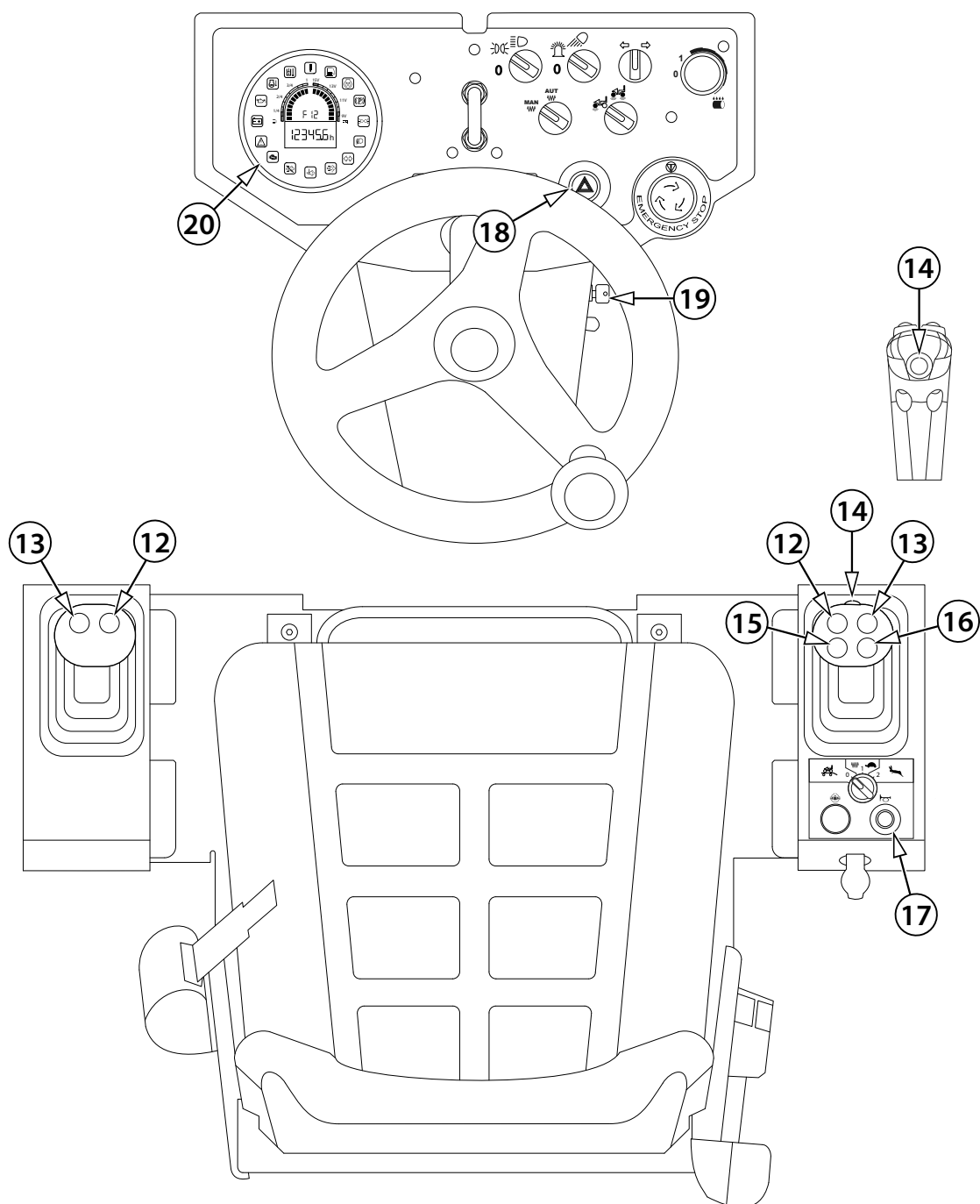
- P – Parking brake – parking brake of the machine enabled
- N – Neutral – the machine is not braked
- 0 – Zero position
- F – Forward travel
- R – Reverse travel

Note

If requested by the customer, the machine can be equipped with the second travel control (11) placed on the left armrest. However, only one of travel controls (11) may remain active.

For the machine travel using one of the controls (the active one), the inactive travel control must be set to the parking brake position (P). If the inactive control is deflected from the parking brake position (P), the machine will stop. When the machine is stopped, move both of the travel controls (11) to the parking brake position (P) and then select the driving direction on the active travel control (11).

2.6 Controls and checking instruments



593004C

**Vibration switch (12)**

Press the switch to turn on/off the vibration function.

**Sprinkling switch (13)**

Press the switch to turn on/off the drum sprinkling function.

**Edge cutter sprinkling switch (14)**

Press the switch to turn on/off the edge cutter sprinkling function.

**Edge cutter button – up (15)**

Pressing the button sets the edge cutter to the transport position.

**Edge cutter button – down (16)**

Pressing the button sets the edge cutter to the transport position.

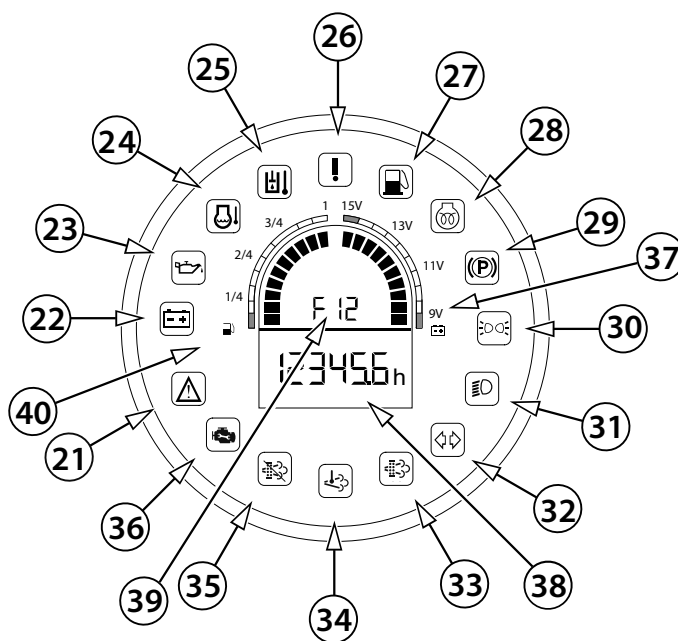
**Warning horn button (15)****Warning lights switch (16)****Ignition box (19)**

- 0 - OFF
- I - ON
- II - Engine glowing
- III - Engine starting

Display (20)

Instrument to display parameters and functions of the engine and of the machine.

2.6 Controls and checking instruments



588015A

Display (20)

Instrument to display parameters and functions of the engine and of the machine.

Indicator lamps

- | | |
|---|--|
| 21 - Error message indicator lamp | 31 - Low beam lights indicator lamp |
| 22 - Battery charging indicator lamp | 32 - Indicator lamp for direction indicators |
| 23 - Engine oil pressure indicator lamp | 33 - DPF clogging indicator lamp |
| 24 - Coolant temperature indicator lamp | 34 - Indicator lamp of high temperature of exhaust gases |
| 25 - Hydraulic oil temperature indicator lamp | 35 - Suppression of DPF regeneration indicator lamp |
| 26 - Emergency stop indicator lamp | 36 - Engine failure indicator lamp |
| 27 - Fuel reserve indicator lamp | 37 - Battery voltage indicator |
| 28 - Engine glowing indicator lamp | 38 - Engine hour counter |
| 29 - Brake indicator lamp | 39 - Error message indicator |
| 30 - Outline lights indicator lamp | 40 - Fuel tank indicator |

The warning indicator lamps for engine oil pressure, battery charging and brakes must light up when the ignition is ON. As soon as you start the engine, the indicator lamps must go off.



AMN58

Error message indicator lamp (21)

The error message indicator lamp lights up when the control system detects an error. At the same time, the error code appears on the display.

- Check the machine according to the table of error message codes.

If the indicator lamp remains lighting, call the service!



2777

Battery charging indicator lamp (22)

When the battery charging indicator lamp lights up during operation or it does not go off after the engine is started, carry out the undermentioned steps:

- Stop the engine.
- Check the V-belt of the engine for damage and loosening. If the indicator lamp is still lit up when the engine is started, contact the service centre.



AMN49

Engine lubrication indicator lamp (23)

When the engine lubrication indicator lamp lights up during operation or does not go off after the engine is started up, you must stop the machine immediately and turn off the engine!

- Check the engine for oil leaks and for correct oil level.
- If the oil level in the engine is correct, call the service!



AMN76

Engine overheating indicator lamp (24)

When the engine overheating indicator lamp lights up during operation, turn off the engine and refill the coolant! Check the cooling circuit for leaks! Check the hoses for damage and missing hose clips.



2635

Hydraulic oil temperature indicator lamp (25)

The hydraulic oil temperature indicator lamp lights up when the oil temperature exceeds 85 °C.

If the oil temperature exceeds 95 °C, the error F32 will appear.



592520

Emergency stop indicator lamp (26)

The emergency stop indicator lamp lights if the emergency brake button (6) is enabled.

If the indicator lamp does not go off when the emergency brake button is disabled, look for the cause!

The engine can be started only after the defect is repaired!



595425

Fuel indicator lamp (27)

When the fuel indicator lamp lights up, the tank capacity is sufficient for half-hour operation of the machine.

Refill the fuel!



3518

Engine glowing indicator lamp (28)

It indicates the engine warming up before the cold start.

2.6 Controls and checking instruments



Parking brake indicator lamp (29)

The lighting indicator lamp indicates that the parking brake was enabled.



Indicator lamp of DPF (Diesel Particulate Filter) clogging (33)

The machine is not equipped with a DPF.



Outline lights indicator lamp (30)

The indicator lamp indicates that the parking lights are ON.



Indicator lamp of high temperature of exhaust gases (34)

The function is not activated.



Headlamps indicator light (31)

The indicator lamp indicates that the headlamps are ON.



Indicator lamp for direction indicators (32)

The indicator lamp indicates that the directions indicators are ON.



Indicator lamp of DPF (diesel particulate filter) regeneration suppression (35)



Worked hours indicator (38)

The machine is not equipped with a DPF.



Engine failure indicator lamp (36)

The indicator lamp indicates an engine failure.

The lighting indicator lamp during operation of the engine indicates a failure.

The engine stalls – the machine stops and the parking brake is engaged.



Fuel level indicator (40)



The engine can be started only after the defect is repaired!



Battery voltage indicator (37)

2.6 Controls and checking instruments

Seat

Seat adjustment

- 1 Backrest inclination adjustment
- 2 Seat springing stiffness
- 3 Longitudinal seat travel
- 4 Seat cross travel

Seat springing stiffness

Turn the switch (2) to set stiffness according to driver's weight between 50 and 120 kg (110 - 265 lb).

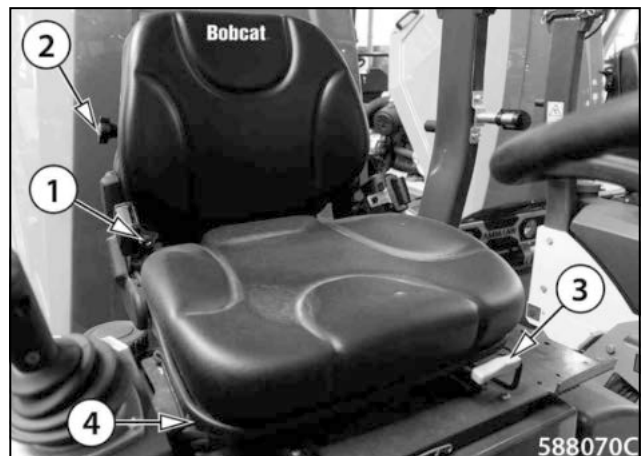


Adjust the seat before driving the machine.

The driver must be fastened with the safety belt while driving.

Non-observance of this instruction can lead to death or serious injury.

During travel of the machine, the driver must have his legs on the machine platform; there is a risk of injury when the machine turns.



Longitudinal seat travel

- After raising the lever (3), it is possible to move the seat in the longitudinal direction forward-rearward.

Seat cross travel

- After raising the lever (4), it is possible to move the seat in the cross direction to the left and right.

Seat switch

The seat switch is located in the seat cushion.

If the driver is not sitting on the seat, the seat switch is deactivated and the operation of the machine is restricted in one of the following ways – blocking of engine start, blocking of moving off, stopping of the machine or switching off the engine.

These restrictions vary depending on:

- the time period for which the seat switch is deactivated,
- the position of the travel control (if it is in the parking brake "P" position or outside this position)

Engine start blocking

If the driver is not sitting on the seat, engine start is blocked unless the travel control is in the parking brake position (P).

To enable engine start, set the travel control to the parking brake position (P).

Movement blocking

If the driver is not sitting on the seat, moving off is blocked. In this case, moving the travel control out of the parking brake (P) position immediately switches off the engine with a 5 second delay.

To enable engine start, sit on the seat and set the travel control to the parking brake position (P).

Machine stop

If the driver leaves the seat for more than 5 seconds and less than 10 seconds when the travel control is not in the parking brake position (P), the machine stops. The traction force of the machine is off, vibration is off and, after a delay, the parking brake engages (P).

To be able to move off again, sit on the seat and set the travel control to the parking brake position (P).

Engine shutdown

If the driver leaves the seat for more than 10 seconds when the travel control is not in the parking brake position (P), the engine shuts down.

To re-enable engine start, sit on the seat and set the travel control to the parking brake position (P).



It is forbidden to load the seat switch with other items!

When operating the machine, the driver must follow the safety regulations and not carry out any activity that might endanger the safety of work; the driver must fully focus on steering the machine.

When operating the machine, the driver must always sit on the seat.

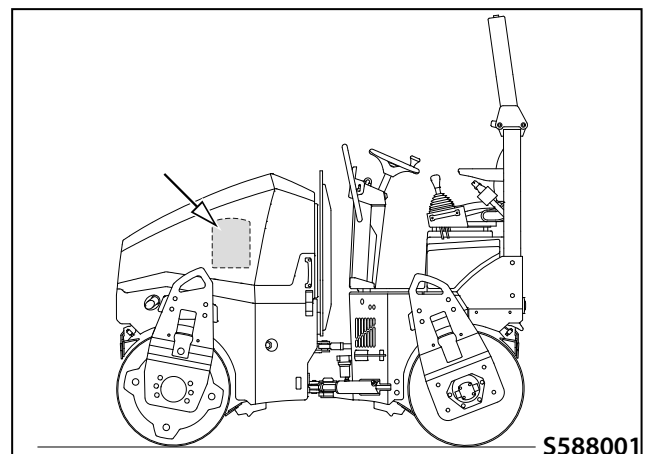
When leaving the machine, the driver must take measures against unauthorized use of the machine and against unintentional starting.

Document box

The storage box situated on the inner left side of the bonnet is used to store the Operating Manual and other documents related to the operation of the machine.



The Operating Manual must always be kept in the machine in an appropriate place to be always available for the driver of the machine for viewing.



S588001

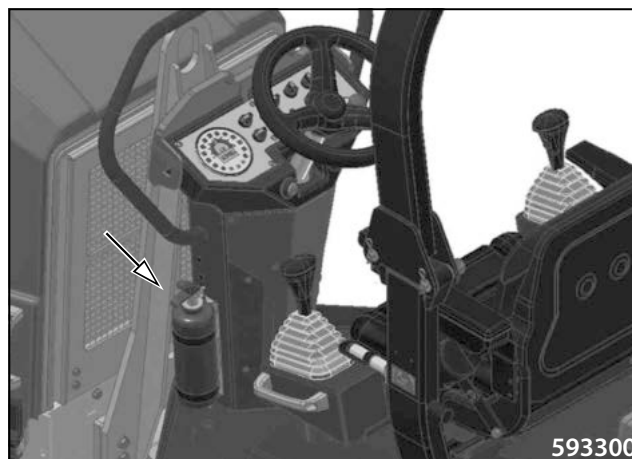
2.6 Controls and checking instruments

Fire extinguisher (optional equipment)

Place to install a fire extinguisher.



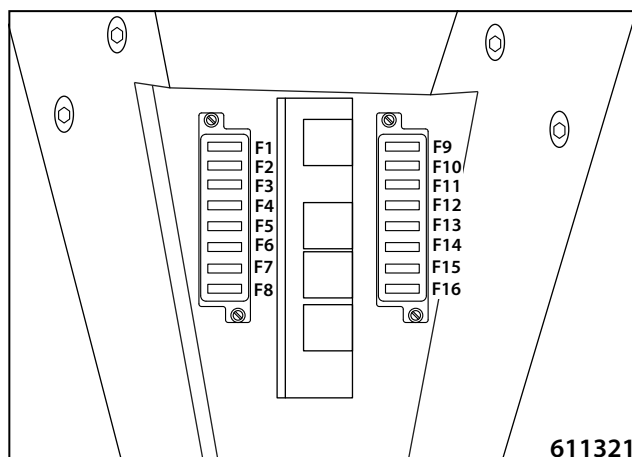
The manufacturer recommends that the machine be equipped with a fire extinguisher.



Fuse box

- F1 – 7.5 A Parking lights
- F2 – 7.5 A Tail lights, licence plate light
- F3 – 15 A Headlamps
- F4 – 15 A Rear light, ROPS lights, beacon, green beacon, monitoring device
- F5 – 5 A Direction indicators
- F6 – 5 A Control unit – electronics
- F7 – 40 A Control unit – power part
- F8 – 5 A Display, alternator excitation
- F9 – 25 A Hydraulic oil cooler
- F10 – 10 A Service socket, seat heating
- F11 – 7.5A (15 A*) Water sprinkling pump, emulsion sprinkling pump at the axle
- F12 – 7.5 A Right travel lever, left travel lever, differential lock switch, working mode selector, horn switch, brake tester, calibration button
- F13 – 7.5 A Horn
- F14 – 5 A Seat switch
- F15 – 5 A Infra thermometer, monitoring device
- F16 Reserve

* ARX23.1C, ARX26.1C



Battery disconnecter fuses

- F20 – 70 A main fuse
- F21 – 35 A Intake/holding coil – Intake coil
- F22 – 7.5 A Fuel pump
- F23 – 5 A Compaction module
- F30 – 50 A Glowing



Dashboard cover

The cover protects the dashboard from:

- weather effects
- vandalism
- handling by others

The cover of the dashboard can be locked with a padlock; the padlock is not delivered in the machine equipment.

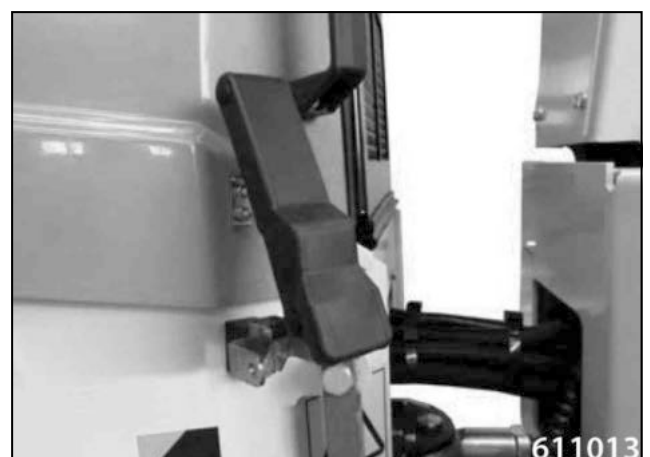
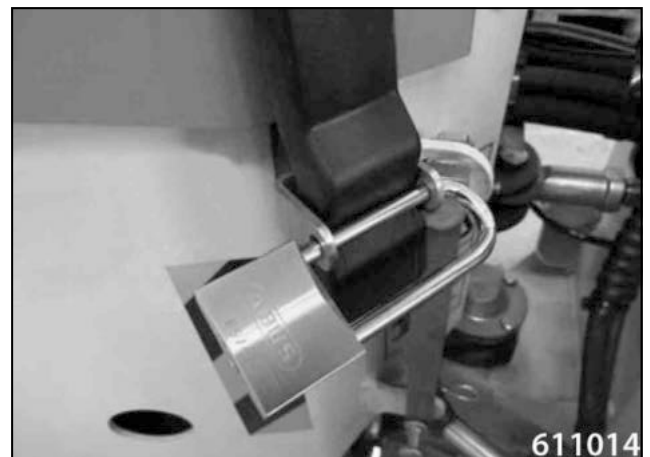


Engine bonnet

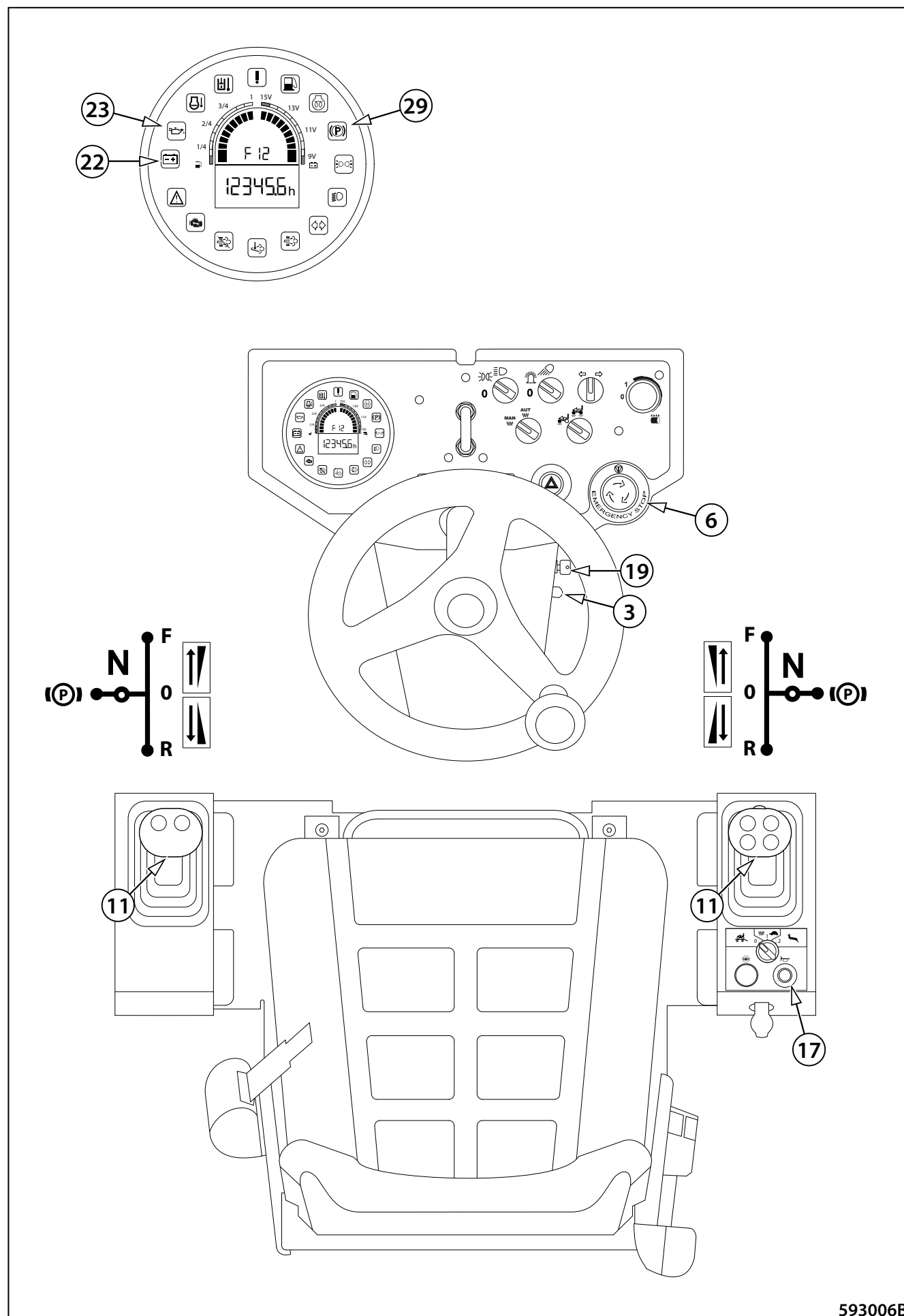
The bonnet protects the engine from:

- weather effects
- vandalism
- handling by others

The bonnet of the engine can be locked with a padlock; the padlock is not delivered in the machine equipment.



2.7 Machine operation and use



593006B

2.7.1 Starting the engine

Daily before starting the engine, check the oil level in the engine and in the hydraulic tank, fuel level in the fuel tank and water level in the water tank. Check that there are no loosened, worn or missing parts on the machine.

Start the engine only from the driver's stand! Use the warning horn to signal the engine starting and check that nobody is endangered by starting the engine!

Starting the engine:

Turn on the battery disconnecter.

Sit down on the seat.

Set the engine speed switch (3) to the idling speed position.

Set the travel control (11) to the brake position (P). When the machine is equipped with two travel controls, set both travel controls to the parking brake position (P).

Check that the emergency brake (6) is not enabled.

Insert the key into the ignition box (19) in the position "0" and switch over to the position "I".

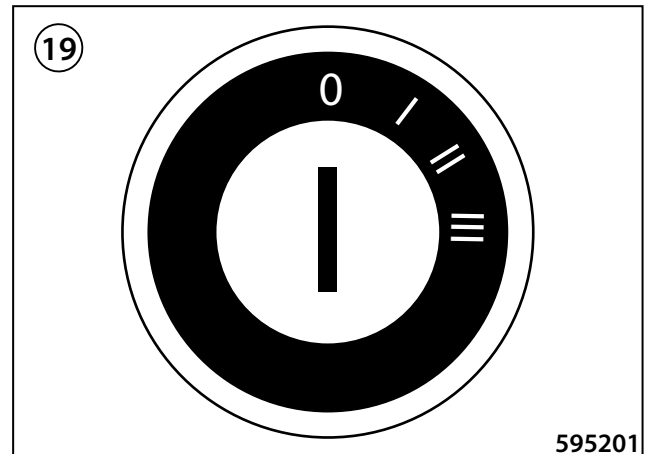
The indicator lamps for battery charging (22), engine lubrication (23) and parking brake (29) will light up on the display (20).

Use the warning horn (17) to signal that the engine is starting.

Hold the key in the "II" position – engine glowing. The indicator lamp (29) for engine glowing will light up on the display.

Then turn the key to the "III" position to start the engine. Once the engine started, release the key. Attention! If the outdoor temperature drops below 0 °C, keep the key in the "II" position for 15 s!

After the start, the indicator lamps for battery charging (22), engine lubrication (23) and engine glowing (28) must go out on the display (20).



When driving with a cold engine and cold hydraulic oil, the braking distances are longer than when the oil has reached its operating temperature.

Do not start the engine for more than 30 seconds. Wait for 2 minutes before starting again.

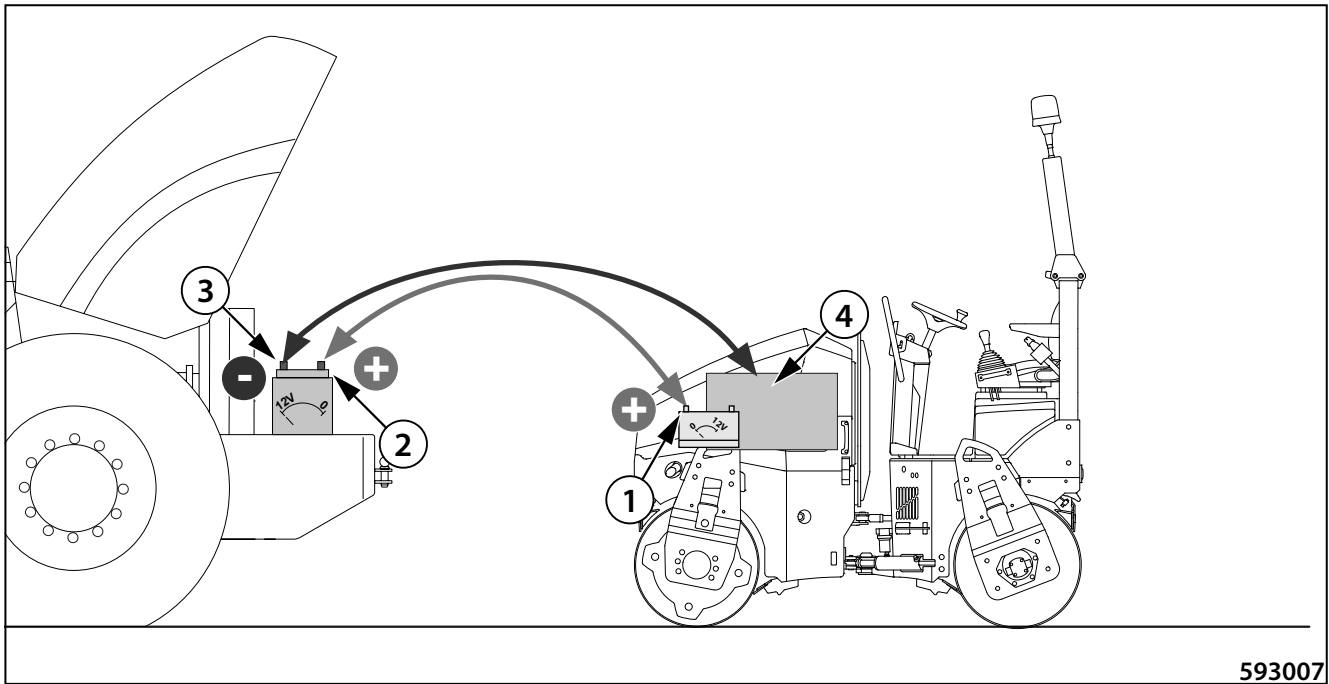
Following the engine start let the engine idle at increased speed for 3–5 min.

If the coolant temperature does not reach at least 40 °C (104 °F), do not load the engine at full power!

Note

If the engine cannot be started or stops after a while, bleed the fuel system according to Chapter 3.6.49.

2.7 Machine operation and use



Start-up procedure using leads from an external power supply:

The starting supply from the external power supply must be 12 V.

Always follow the undermentioned operation sequence.

- 1/ Connect one end of the (+) pole of the cable to the (+) pole of the discharged battery.
- 2/ Connect the other end of the (+) pole of the cable to the (+) pole.
- 3/ Connect one end of the (–) pole of the cable to the (–) pole of the external battery.
- 4/ Connect the other end of the (–) pole of the cable to any part of the started machine, which is attached to the engine (or with the engine block itself).

When the engine has been started, disconnect cables in reverse order.



Do not connect the (–) pole of the cable to the (–) pole of the discharged battery of the machine being started! During the starting heavy sparking may occur and gases of the charged battery may explode.

Uninsulated parts of clamps of the jump leads must not touch each other!

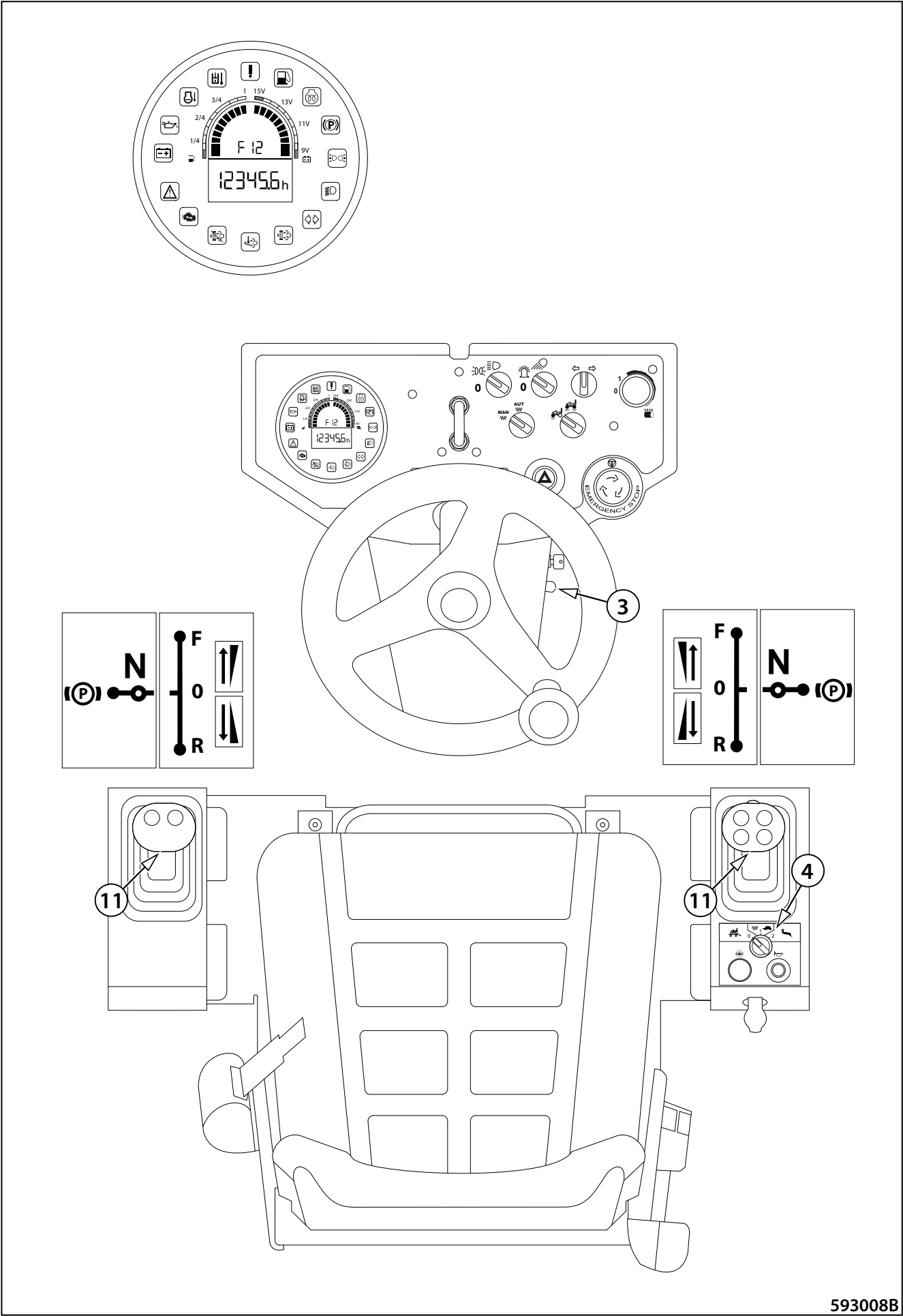
The jump lead connected to the (+) pole of the batteries must not come into contact with electrically conductive parts of the machine – danger of a short circuit!

Do not lean over the batteries – possibility of electrolyte burns!

Remove flammable sources (open flame, burning cigarettes, etc.)

Do not check the presence of voltage in the wire by sparking against the machine frame!

2.7 Machine operation and use



593008B

2.7.2 Drive and reverse drive



Before moving off, check that the articulation joint of the machine is locked.

Use the warning horn to signal that the engine is starting and wait long enough so that all persons could leave the area around the machine or under the machine in time!

Before moving off, check that the area in front of and behind the machine is empty and that there are no persons or obstructions there!

The operator must not control the machine from the ground. If he did so anyway and is not sitting on the seat when the travel control is moved from the parking brake position (P), the machine does not disengage the brake and will not move, and after 5 seconds the engine will be stopped.

The operator must not leave the operator seat when operating the machine. If he does so anyway and leaves the seat when the travel control is in deflected form the parking brake position (P), the machine behaves according to the seat switch description (Chapter 2.6).

Start the engine

- Start the engine according to Chapter 2.7.1.
- The engine speed control (3) must be in its lower position.

Selection of the working engine speed

- The machine is provided with two working speed positions.
- Small working speed: Set the control to the position I (85%).
- Big working speed: Set the control to the position II (100%).

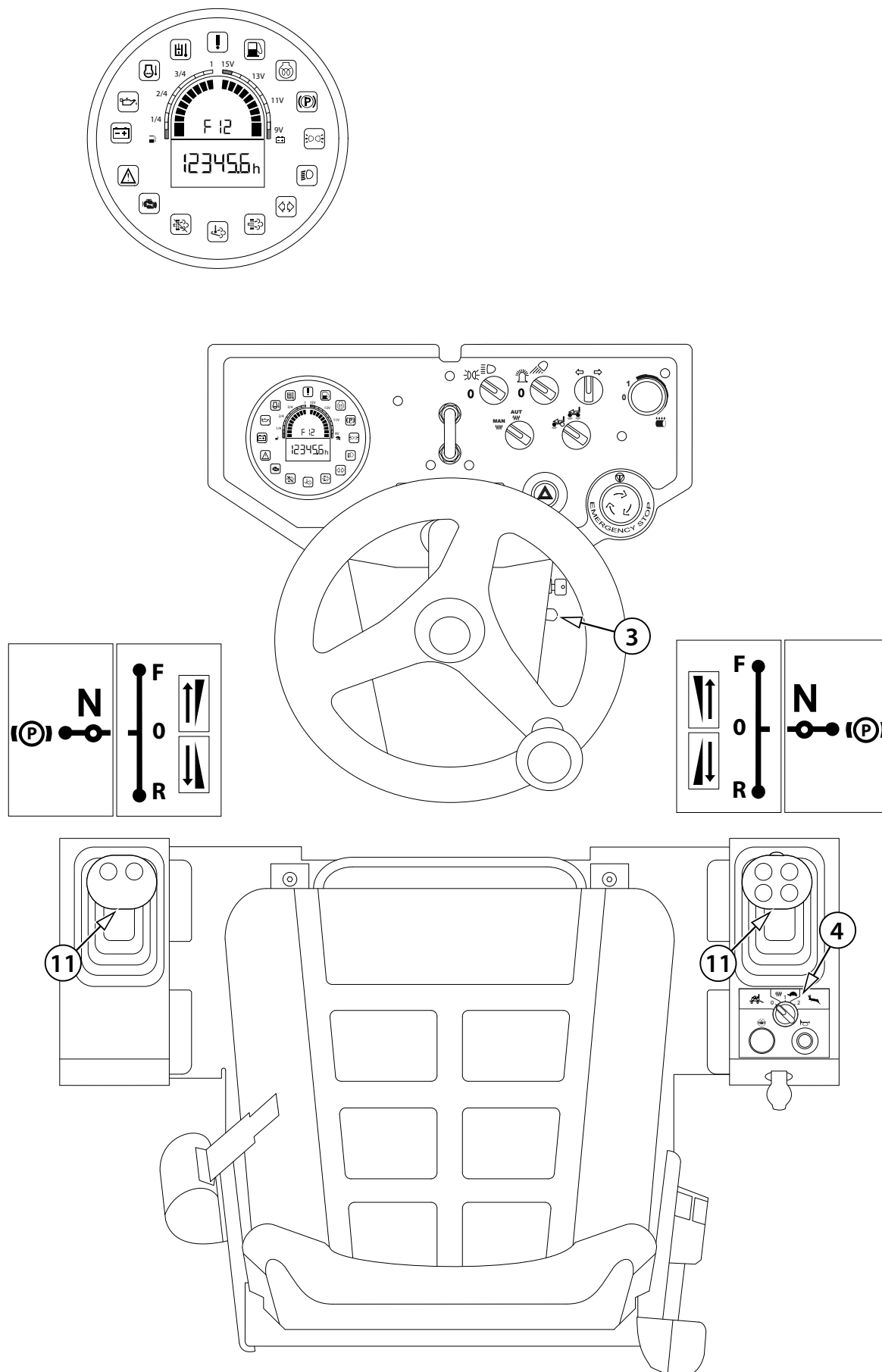
Small working speed:

- 85% travel speed (depending on the transport and working speed change-over switch)
- 85% engine speed

Big working speed:

- 100% travel speed (depending on the transport and working speed change-over switch)
- 100% engine speed

2.7 Machine operation and use



593008B

Selection of the travel direction

- Selection of the travel direction is set on the active travel control. Set and leave the inactive travel control in the parking brake position (P).
- Move the travel control (11) from the parking brake (P) to the neutral position (N) – releasing of the brakes, the parking brake indicator lamp (29) goes out.
- Move the travel control (11) to the position (0) and select a travel direction (F/R).

When the driver releases the travel control (11), it does not return to the zero position automatically. The travel control remains in the selected position.

When the driver quickly moves the travel control (11) through the zero position (0) from the selected direction of the machine travel, e.g. due to a dangerous situation, the machine stops and the parking brake is engaged (panic response).



When the driver moves travel control (11) from the selected direction of machine travel to the neutral position, e.g. due to a dangerous situation, the machine stops but the parking brake is not engaged. This may cause counting movement of the machine when driving down the slope, due to leakages from the hydraulic system.

Travel speed selection

- The travel speed is set on the active travel control. Set and leave the inactive travel control in the parking brake position (P).
- The travel speed corresponds to the deflection of the travel control (11) from the zero position (0) at the given engine speed (3) and mode of operation (4) of the machine.
- The travel speed can be changed with the travel mode switch (4).

Panic response

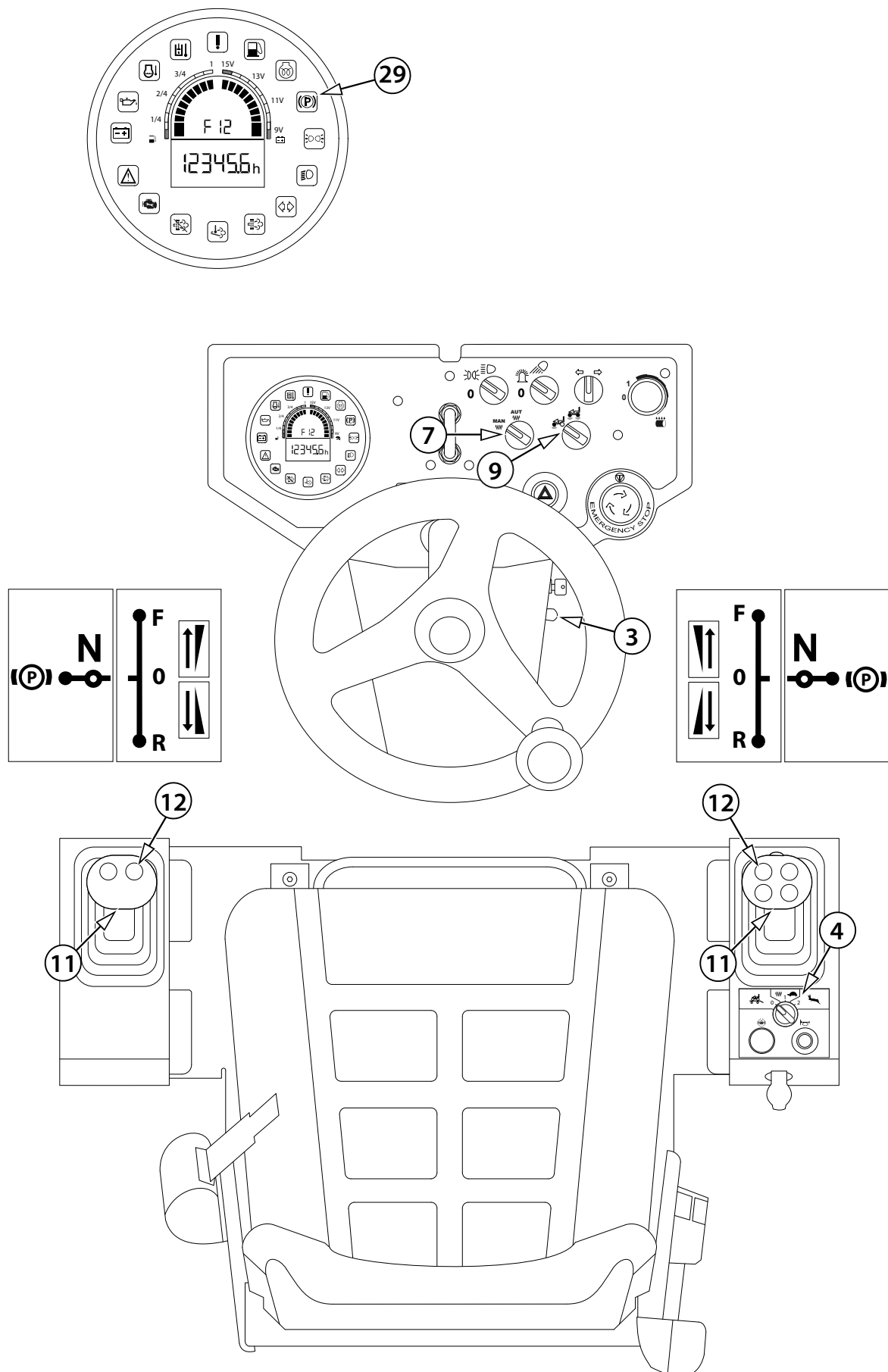
The immediate stop of the machine using the travel control (11) applies to all of the travel modes of the machine. When the travel control (11) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be engaged and the engine will keep running, i.e. panic response. When the machine vibration is on, the vibration will stop also when the manual vibration mode is selected. When the machine is equipped with two travel controls, the panic response can be enabled also on the inactive travel control. The machine can start moving again after the travel control (11) is changed to the neutral position (0) and the travel direction (F/R) is selected.

Note

If the driver leaves the driver's seat while the travel control is not in the brake position (P), the machine behaves according to the seat switch description (Chapter 2.6).

When the driver moves travel control from the brake position (P) without sitting on the seat at that time, the engine will be stopped after 5 seconds.

2.7 Machine operation and use



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Machine travel and reversing with vibration



It is forbidden to enable the vibration when the machine is standing.

If the parking brake indicator lamp (29) is on, move the travel control (11) from the parking brake (P) position to the (0) position.

Manual mode

- Use the vibration mode switch (7) to set the manual mode.
- Use the engine speed control (3) to set the working engine speed I or II.
- Use the vibrating drum selector (9) to select the front drum vibration or front and rear drum vibration.
- Use the travel mode switch (4) to set mode "1" – the working mode of the machine.
- Using the travel control (10) select the forward (F) or reverse (R) travel direction.

Turning on

- Turn on the vibration with the switch (12).

Turning off

- Turn off the vibration with the switch (12).

Note

When the travel control (11) is in the zero position (0), vibration of the machine is still active. Vibration is automatically turned off in the parking brake position (P).

Automatic mode

- Use the vibration mode switch (7) to set the automatic mode.
- Use the engine speed control (3) to set the working engine speed I or II.
- Use the vibrating drum selector (9) to select the front drum vibration or front and rear drum vibration.
- Use the travel mode switch (4) to set mode "1" – the working mode of the machine.
- Using the travel control (11) select the forward (F) or reverse (R) travel direction.

Turning on

- Press the vibration switch (12).
- The vibration will be automatically turned on when the travel speed is more than 1–2 km/h (0.6–1.2 mph).
- The vibration will be automatically turned off when the travel speed is less than 1–2 km/h (0.6–1.2 mph).
- Vibration and sprinkling remains enabled even after the travel control (11) has been smoothly shifted through the zero position (0).

Turning off

- Press the vibration switch (12).

Note

When the travel control (11) is kept in the zero position (0) or set to the parking brake position (P), vibration and sprinkling is automatically turned off.

Panic response

The immediate stop of the machine using the travel control (11) applies to all of the travel modes of the machine. When the travel control (11) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be engaged and the engine will keep running, i.e. panic response. When the machine vibration is on, the vibration will stop also when the manual vibration mode is selected. The machine can start moving again after the travel control (11) is changed to the parking brake position (P) and the travel direction (F/R) is selected.

2.7 Machine operation and use

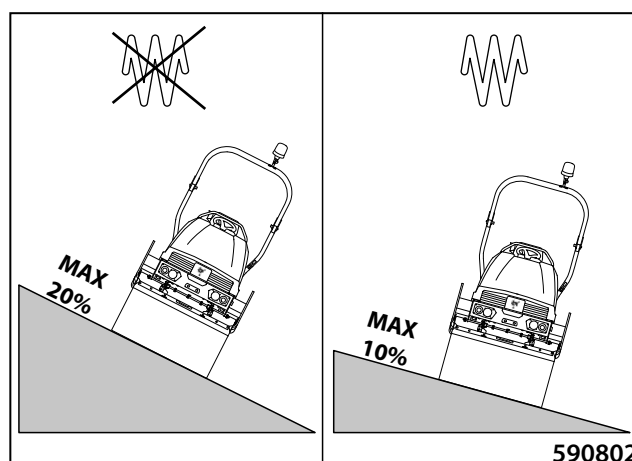
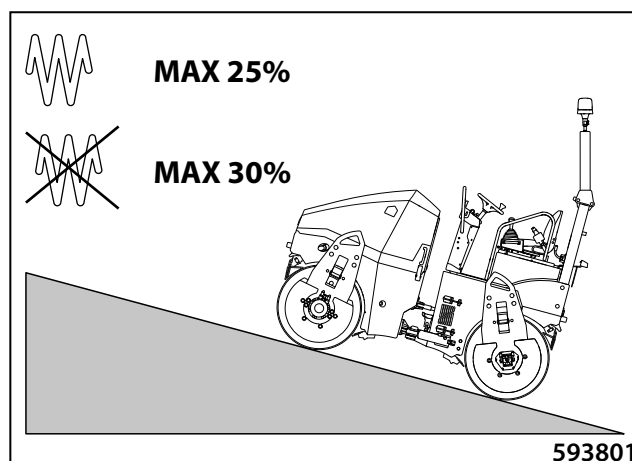


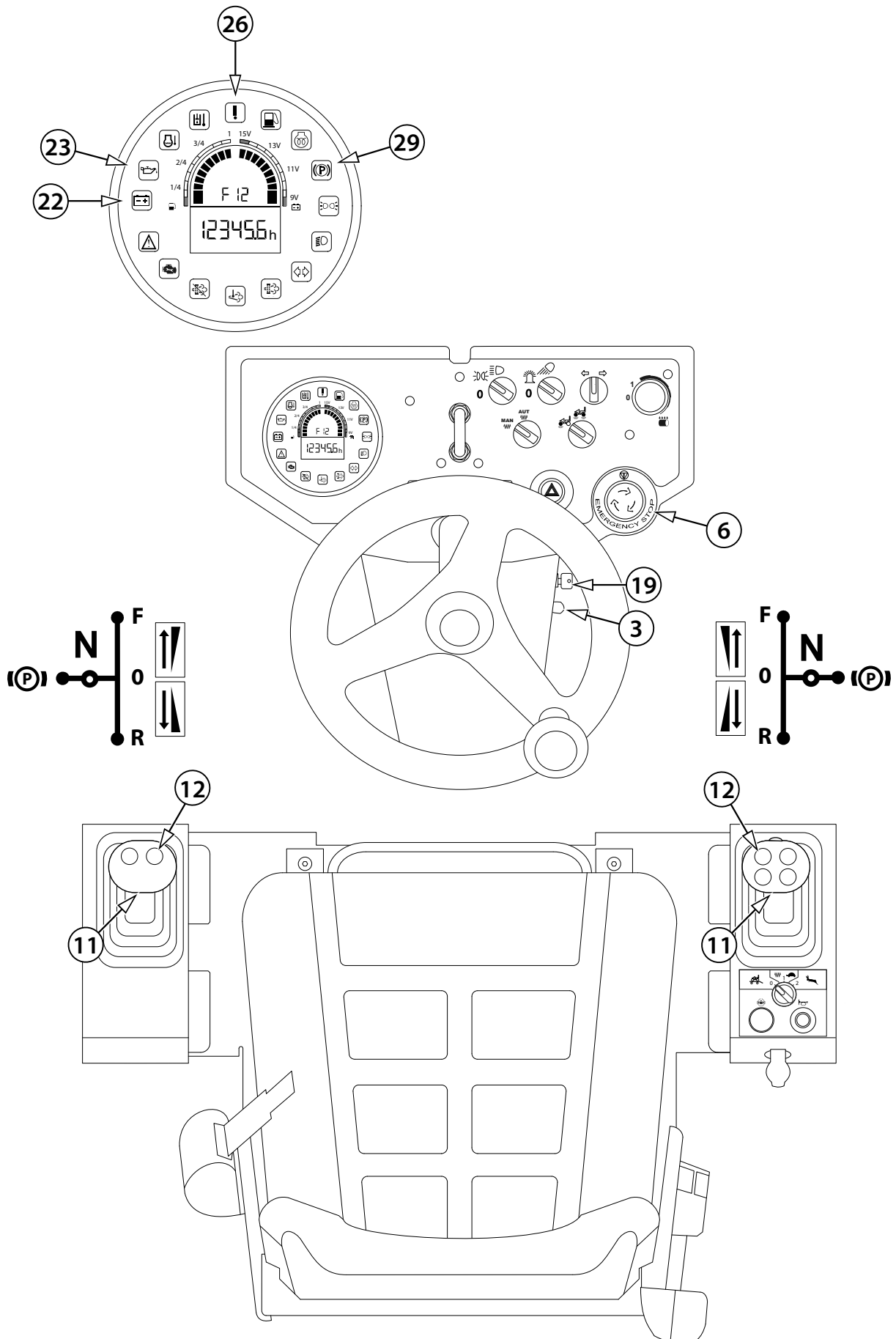
For the maximum permissible slope gradient when driving uphill and across the slope gradient, see figures.

The given values will be lower depending on adhesive conditions and the instantaneous weight of the machine!

Prevent potential danger and pay extra attention to the adherence to permitted slope gradients.

Observe safety precautions. The machine operator must always be fastened with the safety belt.





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2.7 Machine operation and use

2.7.3 Stopping the machine and turning off the engine

Turn off the vibration with the vibration switch (12).

Stop the machine by changing the travel control (11) to the neutral position (N).

Brake the machine by changing the travel control (11) to the brake position (P).

Set the engine speed control (3) to the idle speed.

Switch over the key in the ignition box (19) to the position "0", take out the key from the ignition box and close the lid.

Turn off the battery disconnecter when shutting down the machine.

2.7.4 Machine emergency stop



**In a dangerous situation requiring the machine to immediately stop, press the emergency brake button (6).
The machine will stop moving immediately, the engine will stop working and the parking brake will be enabled.**

Turning on:

Press the emergency brake button (6) to brake the machine immediately, turn off the engine and apply the parking brake.

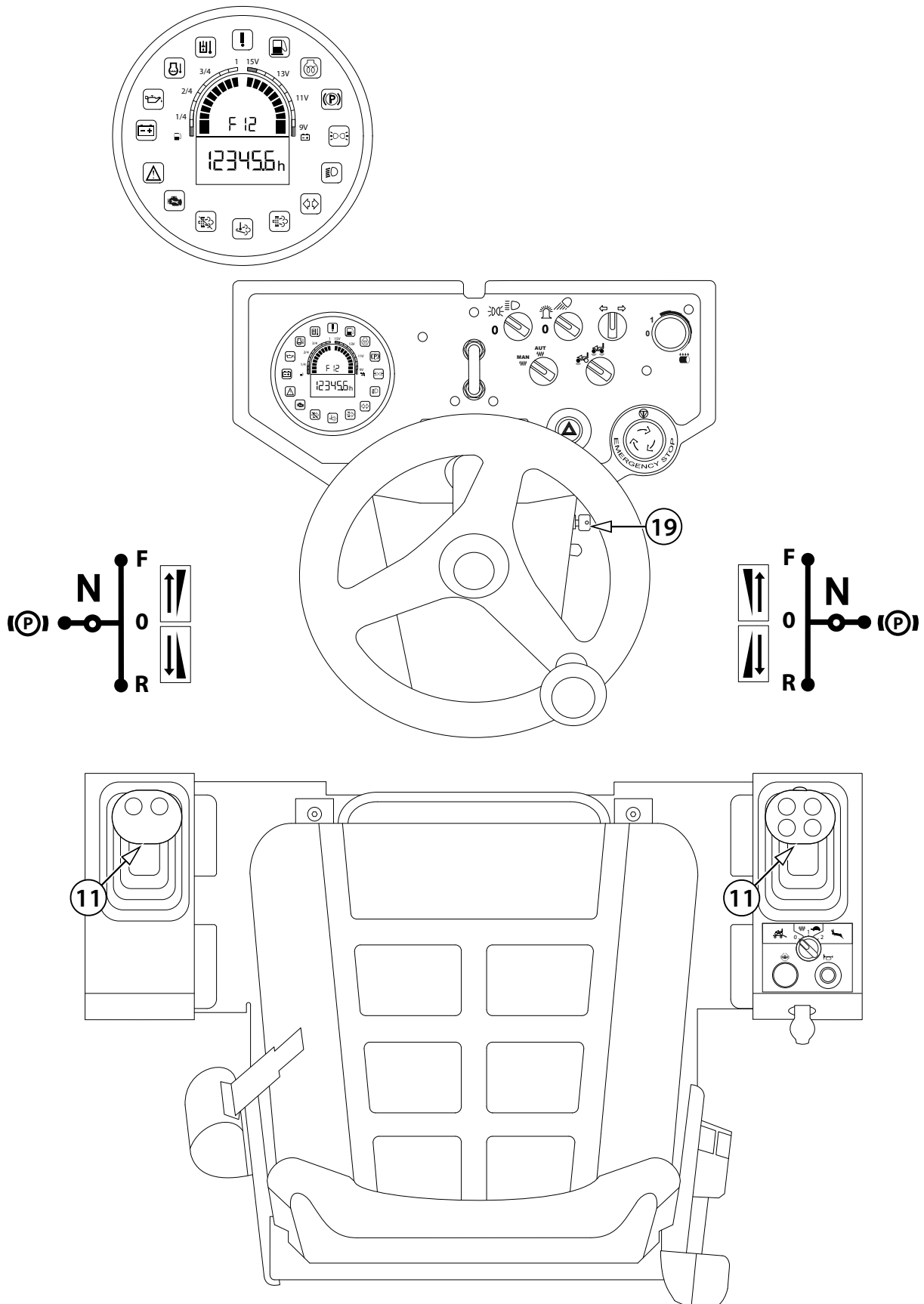
The indicator lamps for battery charging (22), engine lubrication (23), parking brake (29) and emergency stop (26) will light up on the display.

Turning off:

Turn the emergency brake button (6) in the direction of arrows.

The indicator lamps for battery charging (22), engine lubrication (23) and parking brake (29) will remain light up on the display.

Move the travel control (11) to the zero position (0) and the engine speed control (3) to the idle speed position; now start the engine.



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2.7 Machine operation and use

2.7.5 Machine parking

Shut down the machine on a flat and solid surface where there is no potential natural hazard (e.g. landslides, flooding).

Change the travel control (11) to the brake position (P).

Switch over the key in the ignition box (19) to the position "0", take out the key from the ignition box and close the lid.

Turn off the battery disconnecter if it is installed in the machine.

Clean the machine from dirt.

Check the whole machine and repair defects that occurred during operation.

Lock the cover of the dashboard and the engine bonnet with a padlock.

Note

The padlock is not delivered in the machine equipment.

Protect the dashboard and the engine compartment from unauthorized access of others by locking the dashboard cover and the engine bonnet.



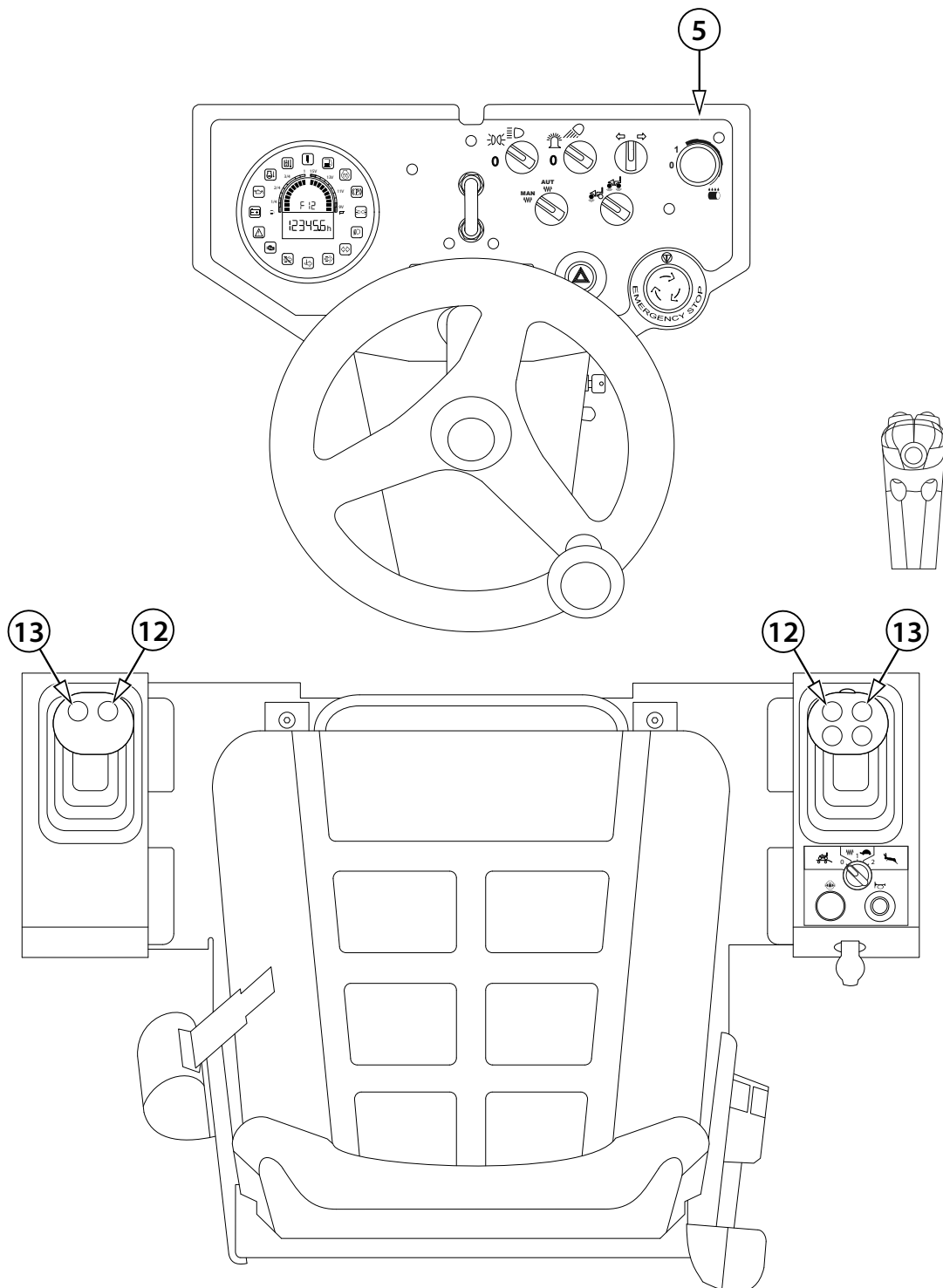
It is forbidden to use the parking brake for bringing the machine to a stop.

2.7.6 Panic response

The immediate stop of the machine using the travel control (11) applies to all of the travel modes of the machine. When the travel control (11) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be engaged and the engine will keep running, i.e. panic response. When the machine vibration is on, the vibration will stop also when the manual vibration mode is selected. The machine can start moving again after the travel control (11) is changed to the parking brake position (P) and the travel direction (F/R) is selected.



It is forbidden to use the panic response for common stopping the machine. Enable the panic response only in emergency when the machine must be stopped immediately.



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2.7 Machine operation and use

2.7.7 Sprinkling

The water level in the tank is shown on the indicator (1).

Hole to fill the water tank (2).

Check the water level in the tank before putting the machine into operation.

Turn on the sprinkling with the sprinkling potentiometer (4).

Position 0 – sprinkling OFF

Position 1 – sprinkling ON

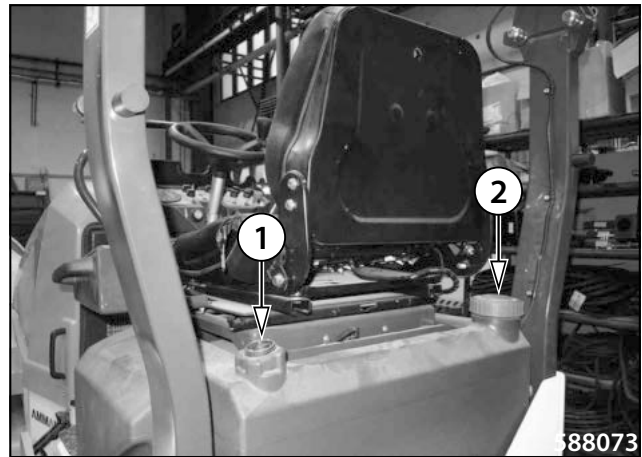
Turning from the position 1 to the right to turn on the interval sprinkling.

In the interval sprinkling mode you can continuously control the sprinkling break interval.

Using the sprinkling switch (13), it is possible to turn on the sprinkling at any time, e.g. before driving on a compacted bitumen surface.

Note

At a combined machine, the sprinkling switch (13) is used for sprinkling the tyres and the sprinkling potentiometer (5) is used for sprinkling the drum.



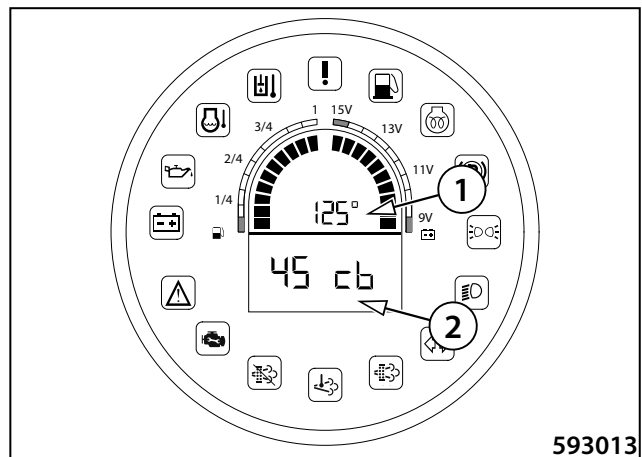
2.7.8 Compaction Measurement System (CMS) (optional equipment)

The CMS system measures current surface compaction at the front drum and shows the value of compaction in the unit of cb (MN/m) on the multifunctional display.

1 - surface temperature

2 - compaction value

CMS is switched on and off by pressing the vibration switch (12). Values are not saved or printed.

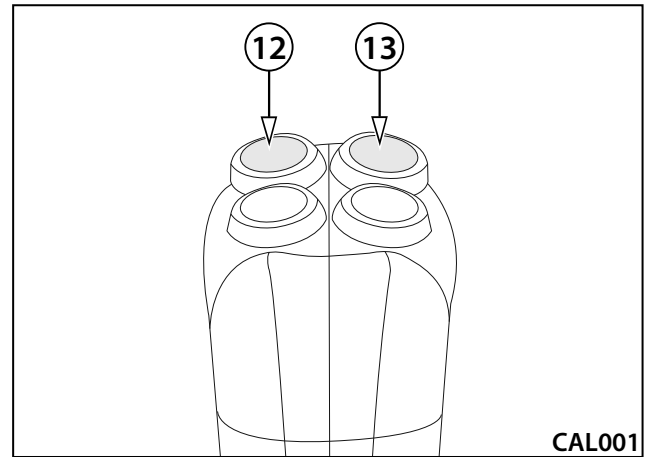


2.7.9 Infrared Thermometer (optional equipment)

It is activated by turning on the key in the switch box (19) and it displays the temperature of the bitumen surface being rolled. The measured temperature in °C is indicated on the display.

Control

In the following text, the "OK button" means the vibration button (12). The "select button" means the sprinkling button (13). These buttons only work on the right travel control.



Procedure to set the units of measure °C or °F

After setting the required parameters on the display of the infrared thermometer, the values are saved automatically.

Remove the cover.



Turn the key in the ignition box to the "I" position.

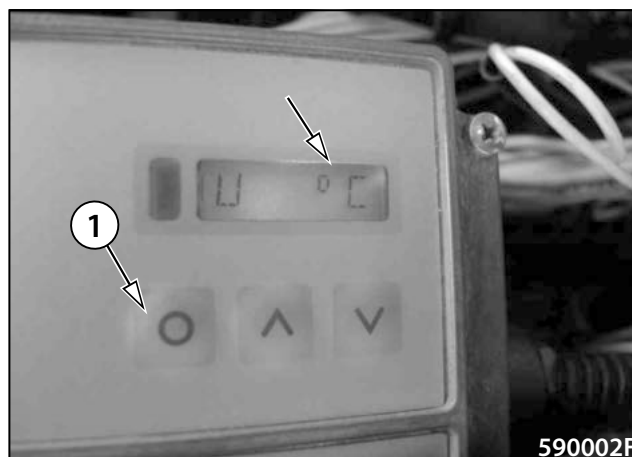


2.7 Machine operation and use

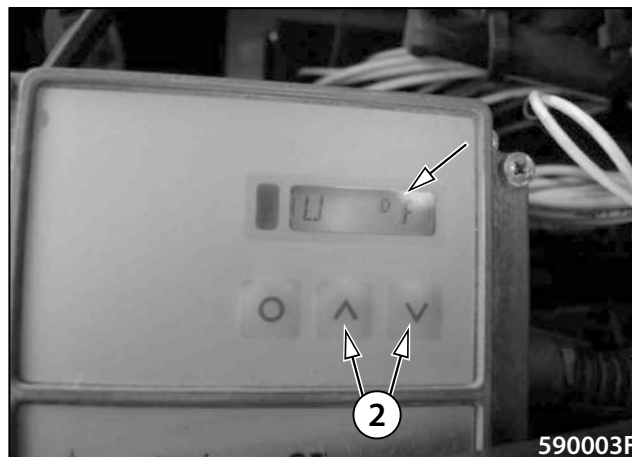
The infra thermometer display will light up.



Switch over with the MODE button (1) until °C appears on the display.

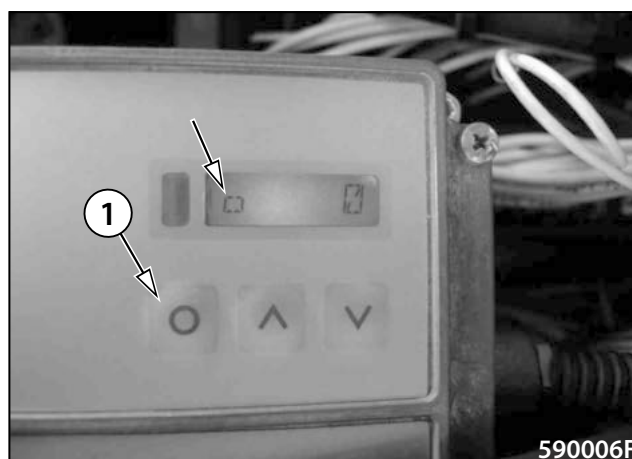


Switch over with the UP and DOWN arrows (2) until °F appears on the display.

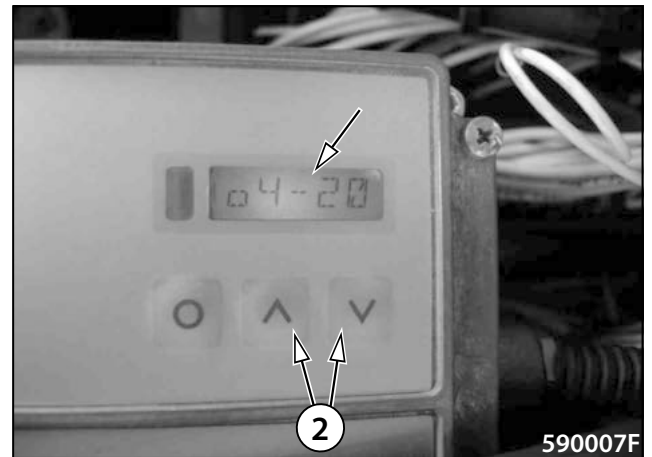


Set the current output of the infra thermometer.

- Switch over with the MODE button (1) until the "o" symbol appears on the display.

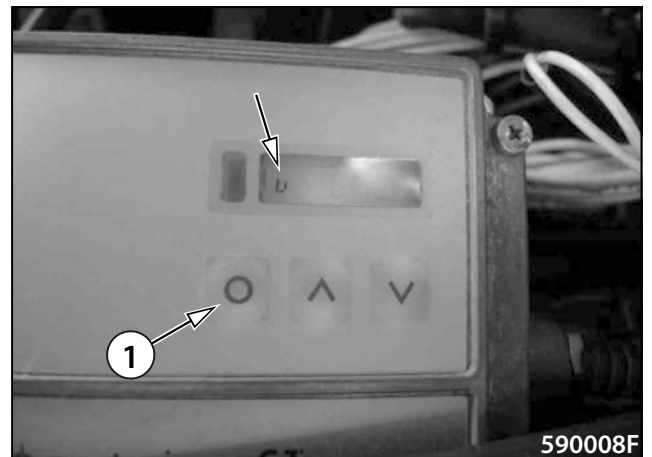


- Switch over with the UP and DOWN arrows (2) until 4–20 mA appears on the display.

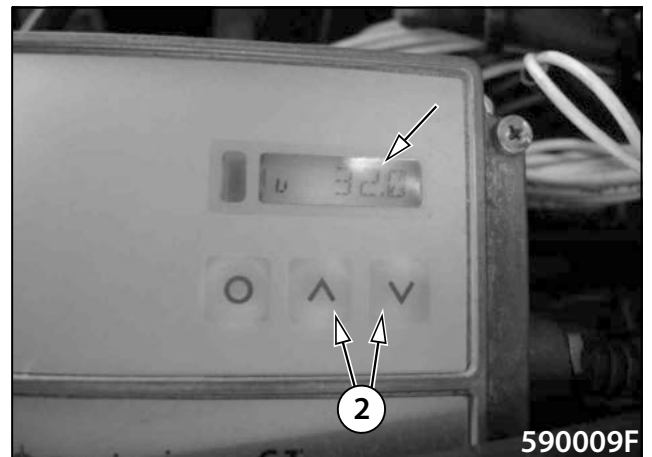


Set the minimum temperature.

- Switch over with the MODE button (1) until the "u" symbol appears on the display.

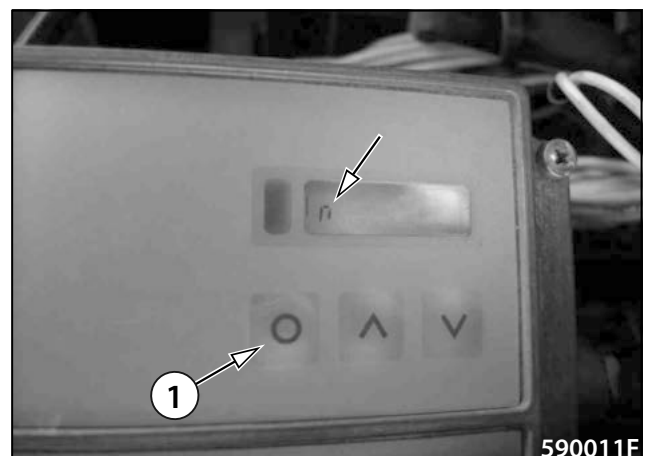


- Switch over with the UP and DOWN arrows (2) until the value of 32.0 °F appears on the display.



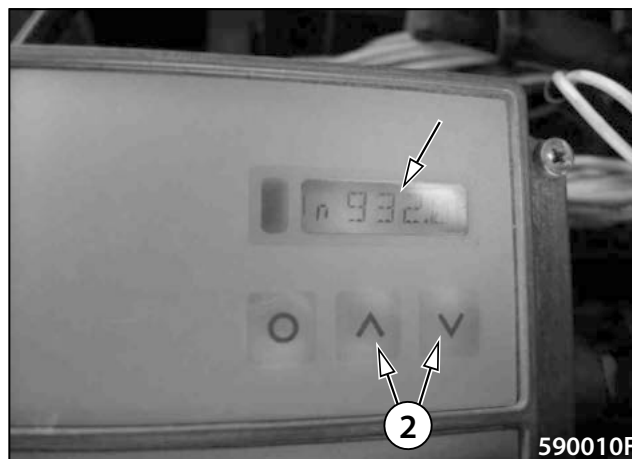
Set the maximum temperature.

- Switch over with the MODE button (1) until the "n" symbol appears on the display.



2.7 Machine operation and use

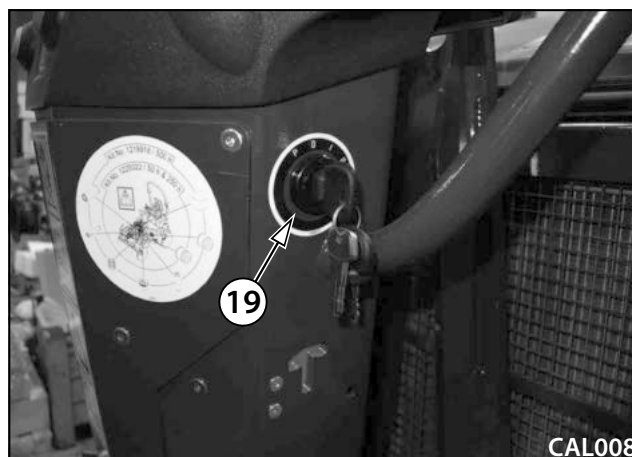
- Switch over with the UP and DOWN arrows (2) until the value of 932.0 °F appears on the display.



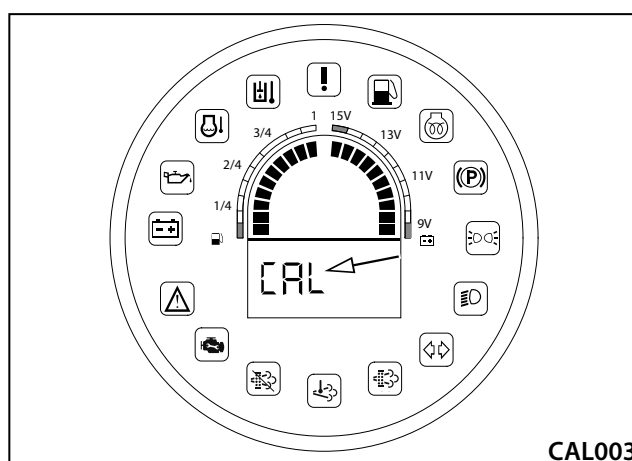
- Mount the cover.

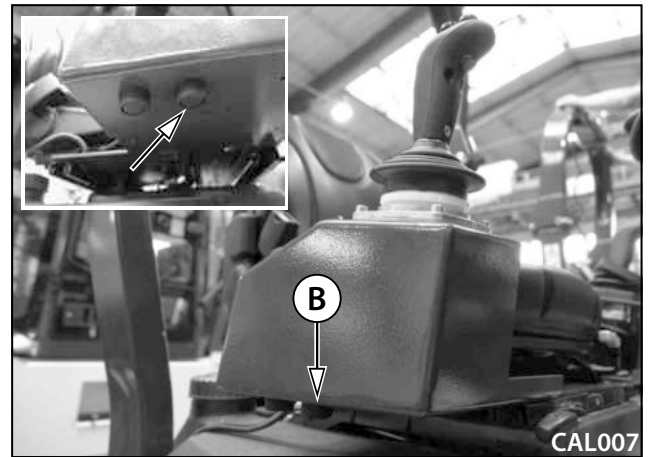


Turn the key in the ignition box to the "I" position.

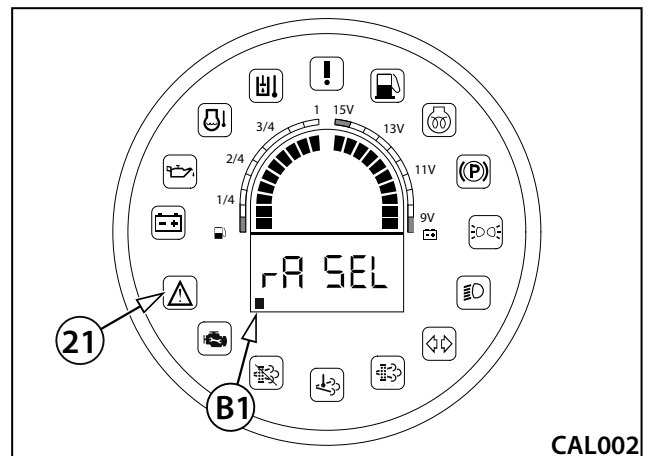


Sit in the driver's seat (activation of the seat switch).
Set the travel control to the parking brake position "P".
Press the calibration button (B) for 5 seconds. While the button is held down, the display shows the "CAL" status.

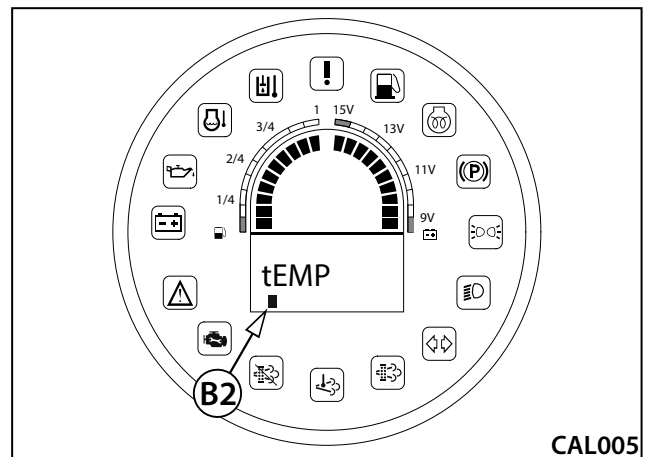




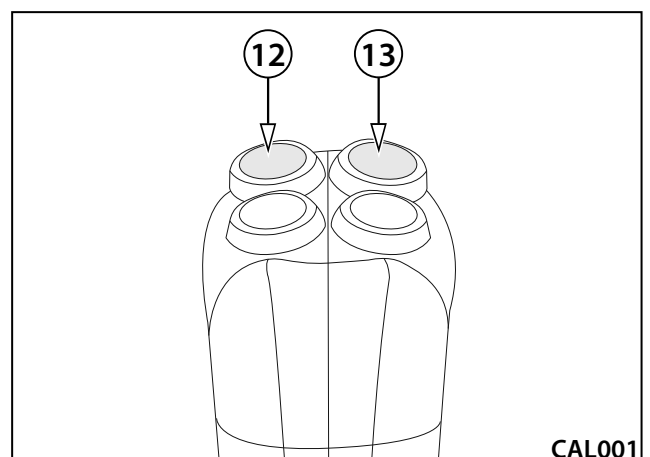
After 5 seconds, the display shows B1 and, at the same time, the error message indicator lamp (21) starts flashing.



Using the Select button (13), scroll to the B2 tab (Fahrenheit/ Celsius temperature unit selection) and press OK (12) to confirm.

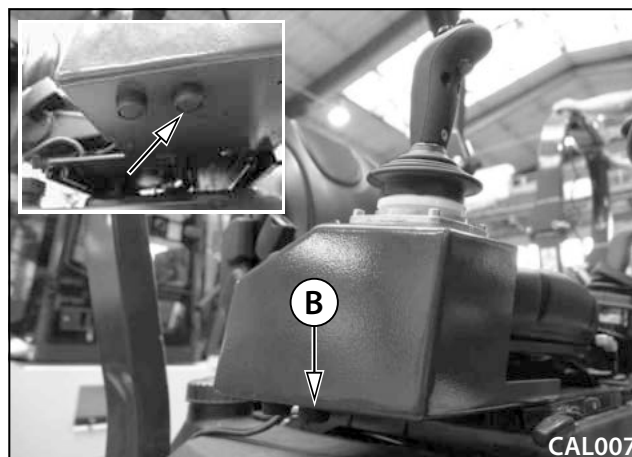


Use the Select button (13) to set the desired unit and press OK (12) to confirm.



2.7 Machine operation and use

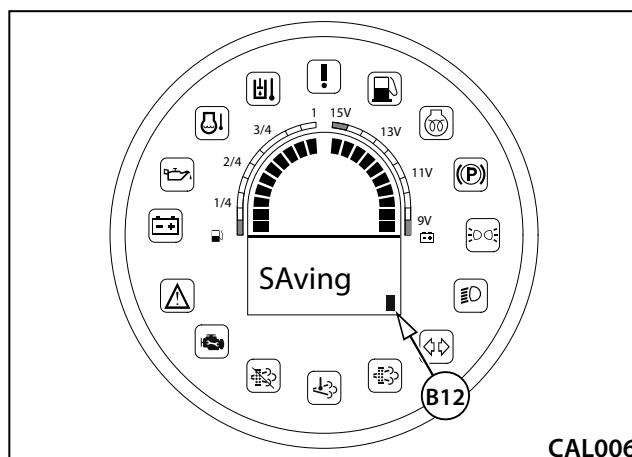
Use the Select button (13) to scroll to the B12 tab and press the calibration button (B) for 5 seconds.



While the button is held down, the display shows the "Saving" status.

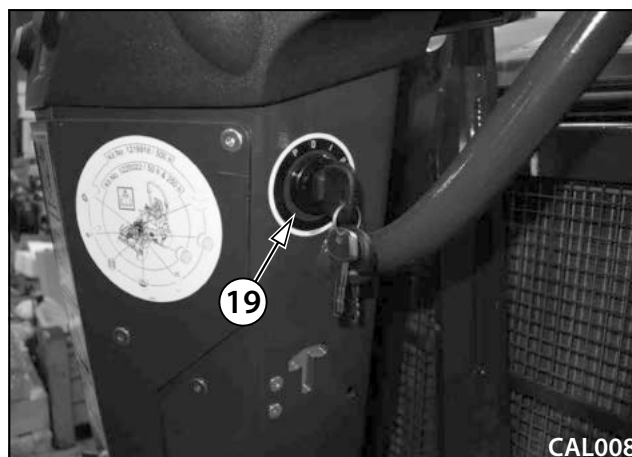
If the parameters are OK, they are saved and the display shows the "Saved" status.

If the set parameters are not OK, the display shows the "Error" status. The set parameters are not saved and the whole process must be repeated.

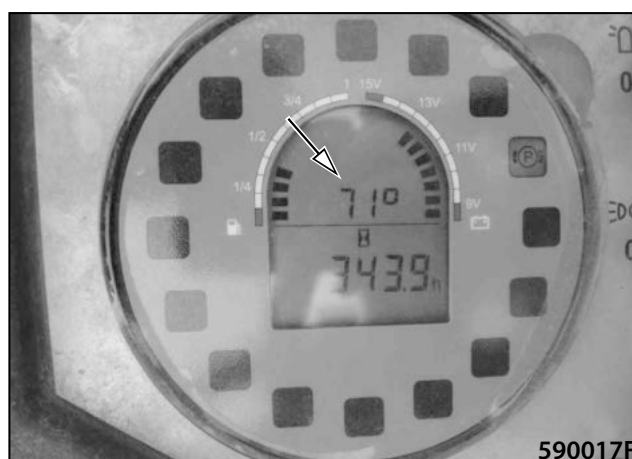


To complete the setting, switch off ignition by turning the key in the ignition box (19) to the "0" position.

To exit the calibration mode without saving, switch off ignition or press the calibration button for 5 seconds when the tab is not set to B12.



Start the engine. The display will show the measured value in degrees Fahrenheit or Celsius.



2.7.10 ROPS lifting and lowering

ROPS lifting

Lift the ROPS to the vertical position and mount the front screws of the ROPS on the left and right side.



Mount the cotter pins.



2.7 Machine operation and use

ROPS lowering

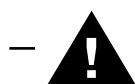
Remove the split pins.



Dismount the front frame screws on the left and right sides.



Tilt the ROPS safety frame to the back and secure it in a suitable way.



Tilt and lift the ROPS with the help of another person.
There is a risk of injury from the falling ROPS.
Do not operate the machine when the ROPS is lowered.
There is a risk of fatal injury.
Lower the ROPS only during the transport.



The tightening torque of the ROPS screws is 147 Nm.

2.7.10.1 Lowering and raising of the ROPS frame with a plastic canopy

Only lower or raise the ROPS frame with the help of another person.



It is forbidden to lower or raise the ROPS frame without the help of another person.

Use the lowered frame only for transporting the machine. Do not operate the machine when the ROPS frame is lowered.

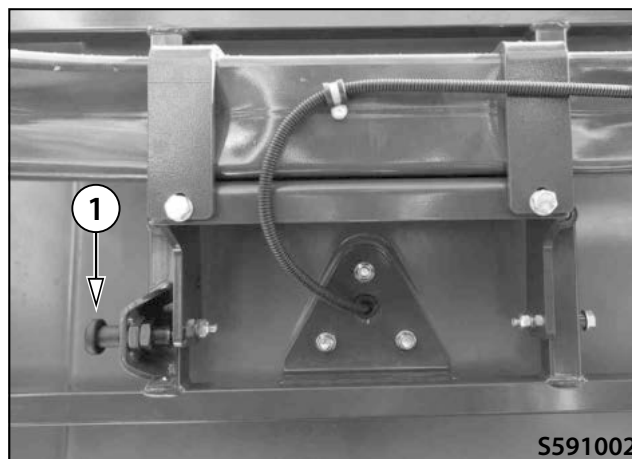
Lowering procedure

Remove the screws (2x) at the bottom of the plastic canopy.



2.7 Machine operation and use

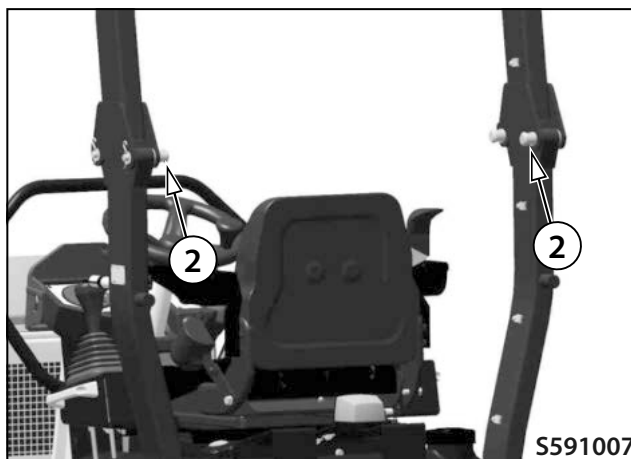
Release the canopy by pulling out the lever (1) slightly and lower the canopy.



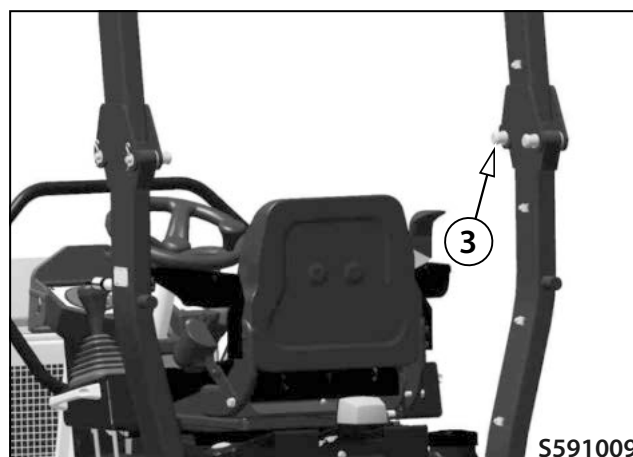
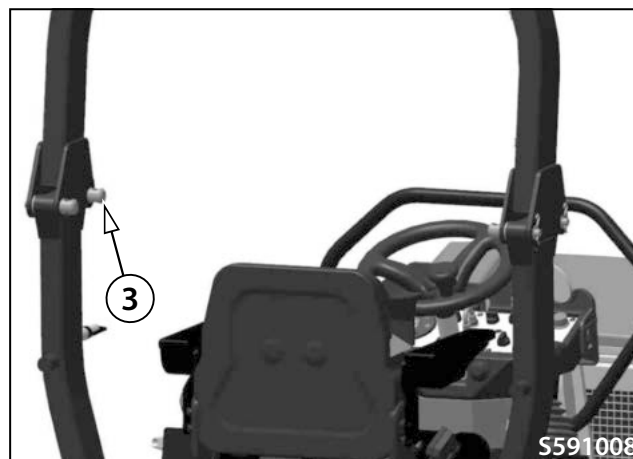
Remove the cotter pins on the left and right side of the ROPS frame.



Loosen the rear pegs (2) on the left and right side of the ROPS frame by approximately two turns.



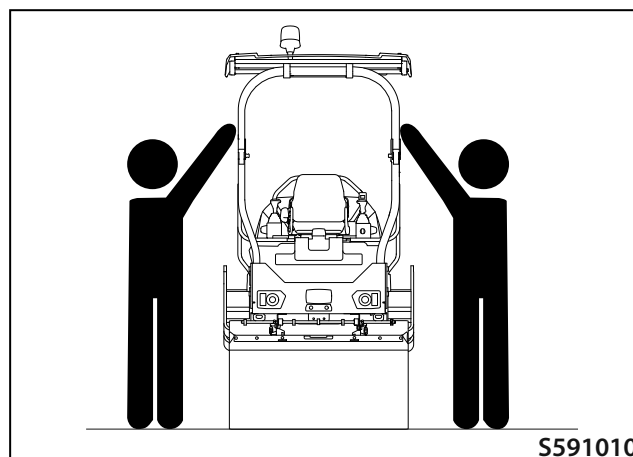
Remove the front pegs (3) on the left and right side of the ROPS frame.



Lower the ROPS frame with the help of another person.

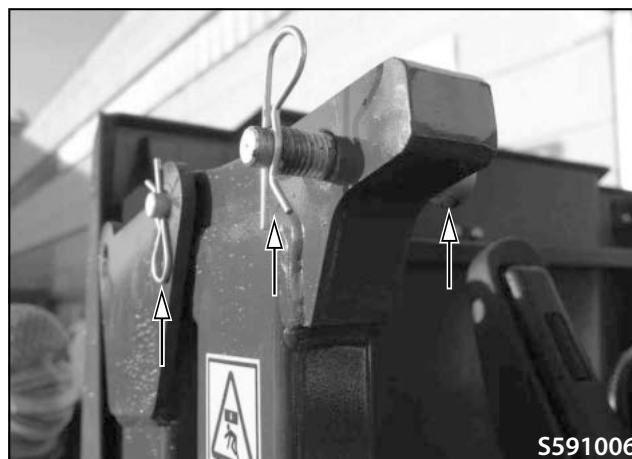


The frame may fall when it is being raised or lowered and cause injury.



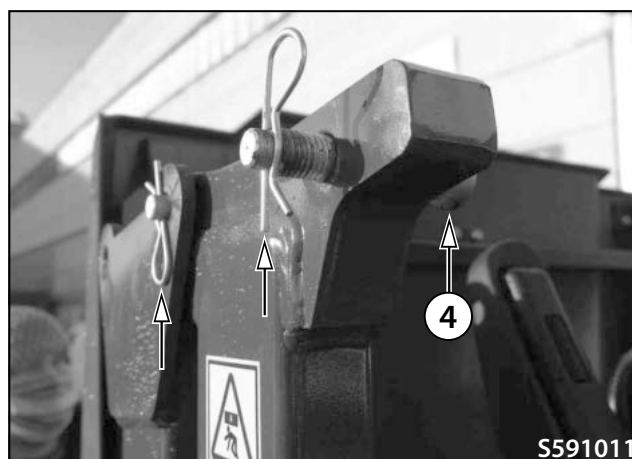
2.7 Machine operation and use

Insert the pegs at the top of the frame on the right and left side and secure them with cotter pins.



Raising procedure

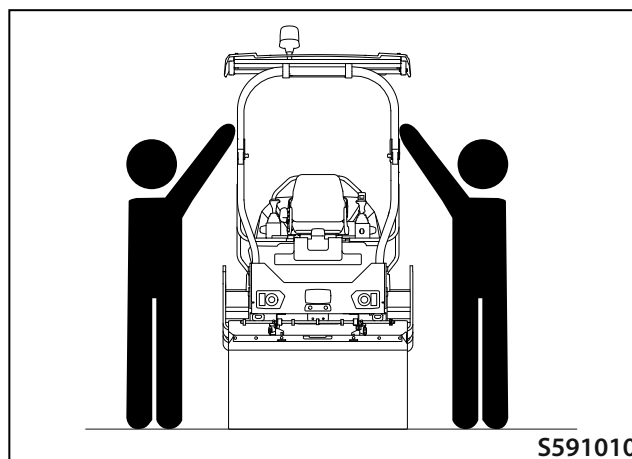
Remove the cotter pins and remove the front pegs (4) on the left and right side of the ROPS frame.



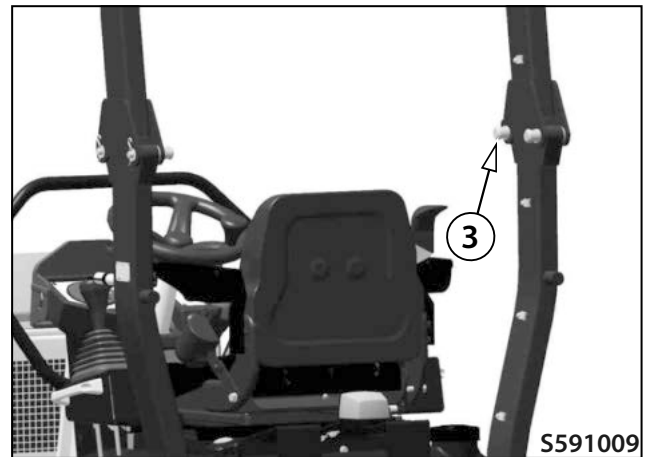
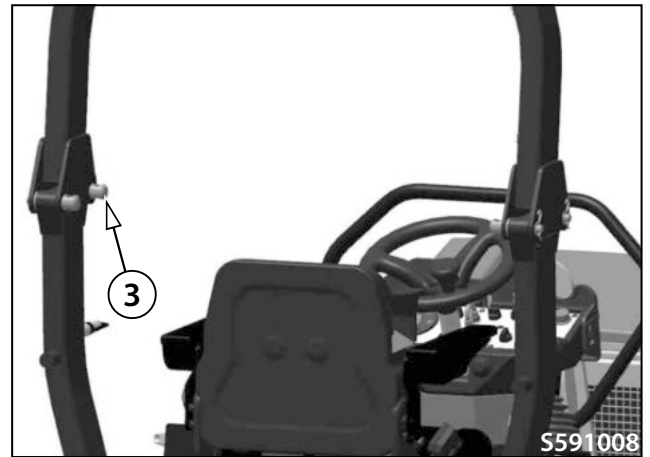
Raise the ROPS frame with the help of another person.



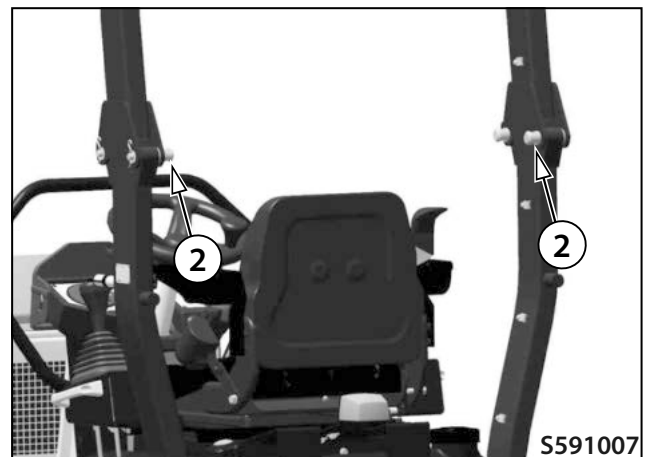
The frame may fall when it is being raised or lowered and cause injury.



Insert the front pegs (3) on the left and right side of the ROPS frame.



Tighten the rear pegs (2) on the left and right side of the ROPS frame.

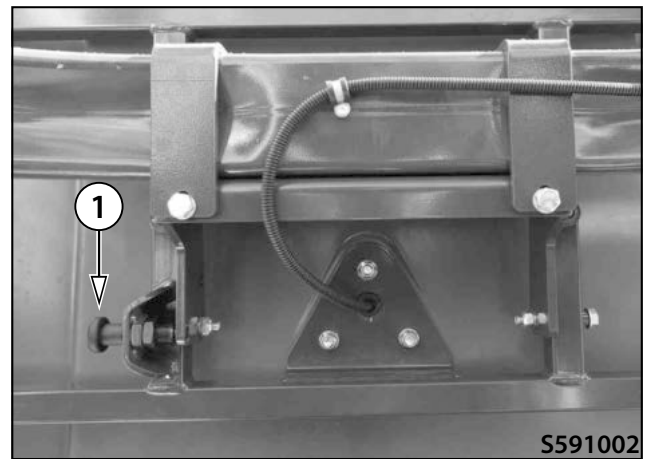


Mount the cotter pins on the left and right side of the ROPS frame.



2.7 Machine operation and use

Release the canopy by pulling out the lever (1) slightly and raise the canopy.



Mount the screws (2x) at the bottom of the plastic canopy.



2.7.12 Edge cutter (optional equipment)

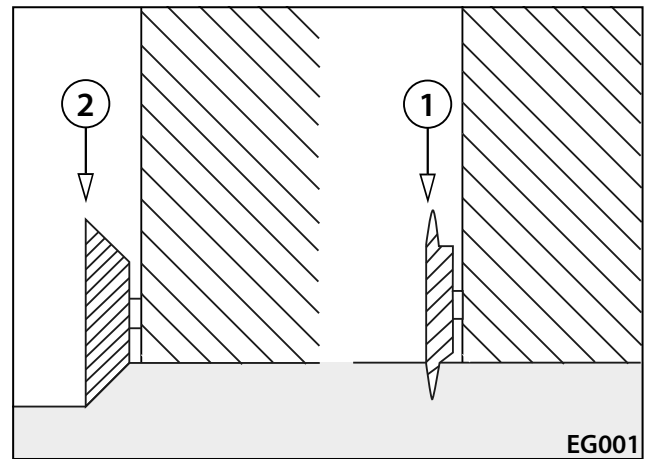
The edge cutter set contains a cutting and compaction disc.

The cutting disc (1) is used to cut the road at the desired location and align the road edges.

The compaction disc (2) is used to finish the compaction of road edges.

Note

If one of the discs is not in use, attach it to the holder provided.



Edge cutter pre-adjustment

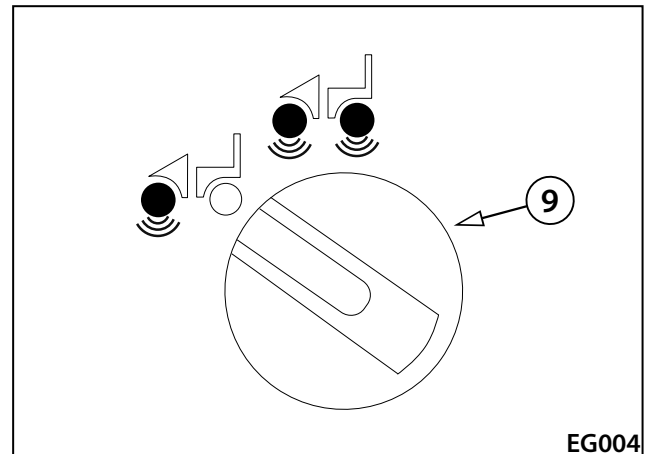
Before working with the edge cutter, set the vibrating drum selector (9) to the left (front drum).

Note

The edge cutter only works flawlessly with a pre-adjusted edge cutter.

Control procedure

Set the desired height of the edge cutter using its up (15) and down (16) button.



Make sure nobody is endangered when the edge cutter is started.

Turn on drum sprinkling using the sprinkling button (13).

Turn on edge cutter sprinkling using the edge cutter sprinkling button (14).

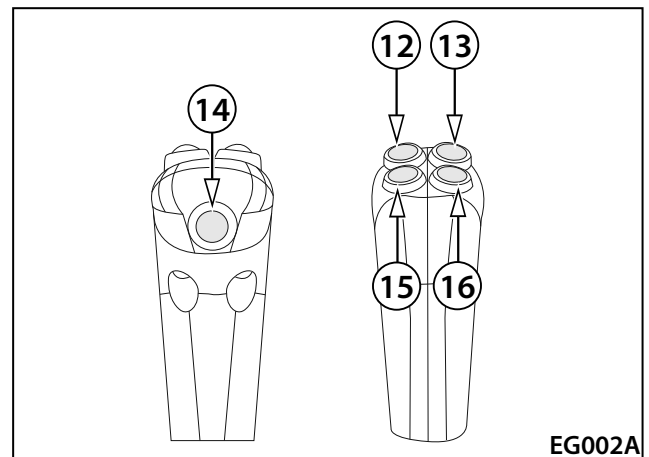
Note

The water inlet of edge cutter sprinkling only works when continuous drum sprinkling is on.

Turn on vibration with the vibration switch (12).

Note

After turning on vibration, the edge cutter automatically rises and is inoperative.



2.7 Machine operation and use

2.7.13 Calibration mode

Tabs

B1 Ramp selection (rA SEL)

- selection of the Hard value
- selection of the Soft value
- return one level

B2 Fahrenheit/Celsius temperature unit selection (tEMP)

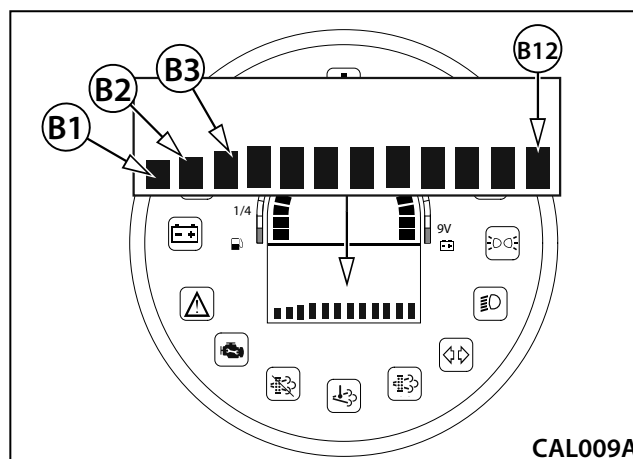
- selection of the Fahrenheit value
- selection of the Celsius value
- return one level

B3 Left lever selection (LEFtLu)

- selection of active lever
- selection of inactive lever
- return one level

B12 Save and exit (SAvE)

- Values saved
- Error saving values

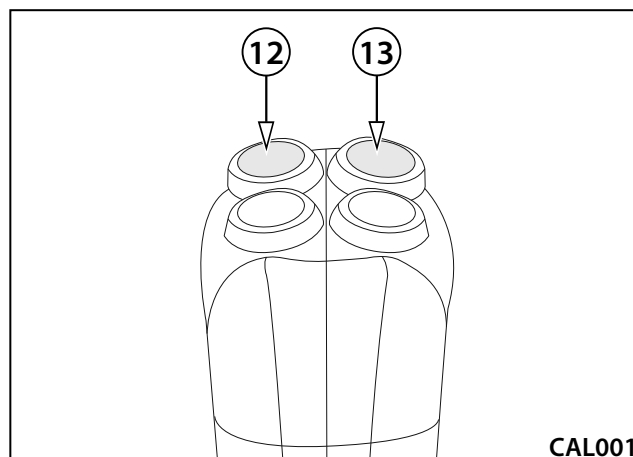


Control

In the following text, the “OK button” means the vibration button (12). The “select button” means the sprinkling button (13). These buttons only work on the right travel control.

Press the select button (13) to scroll through tabs B1 to B12 and parameters of the given folders.

Use the OK button (12) to confirm your selection.



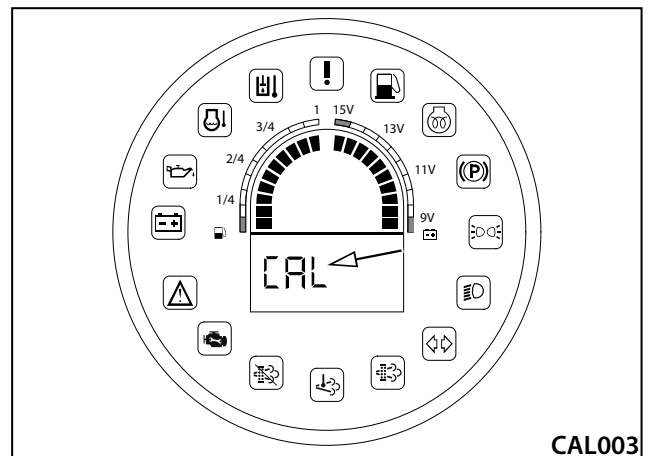
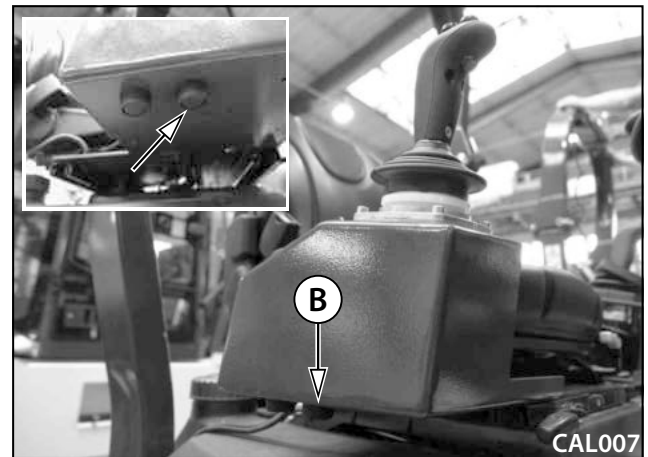
Calibration procedure:

Turn the key in the ignition box to the "I" position.

Sit in the driver's seat (activation of the seat switch).

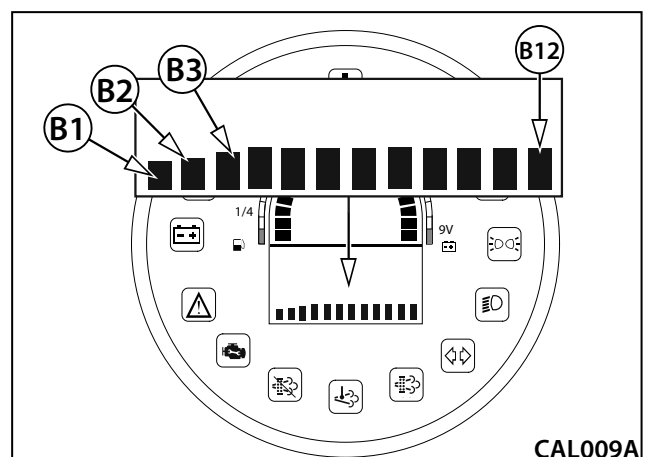
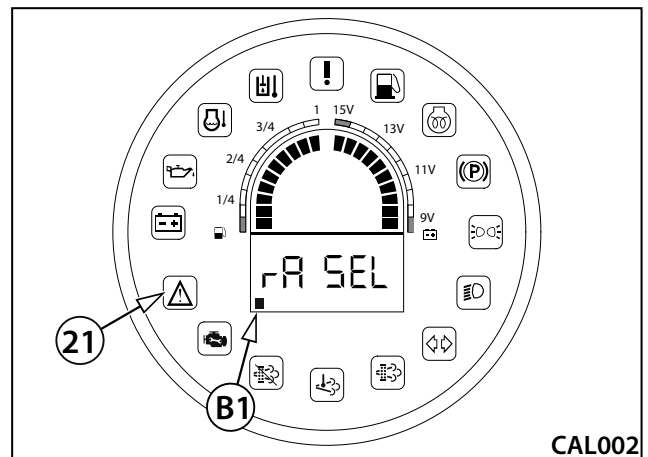
Set the travel control to the parking brake position "P".

Press the calibration button (B) for 5 seconds. While the button is held down, the display shows the "CAL" status.



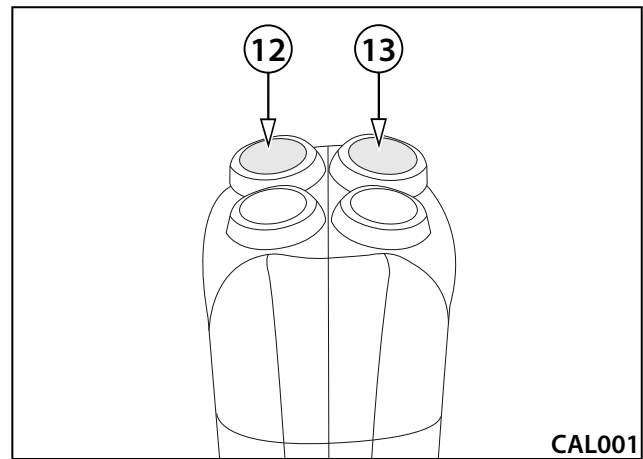
After 5 seconds, the display shows B1 and, at the same time, the error message indicator lamp (21) starts flashing. The error message indicator lamp (21) flashes for the duration of the calibration.

Use the select button (13) to select the tab and press OK (12) to confirm. The display will show the current state of the set parameter (e.g. SOFT when choosing the ramp – B1).

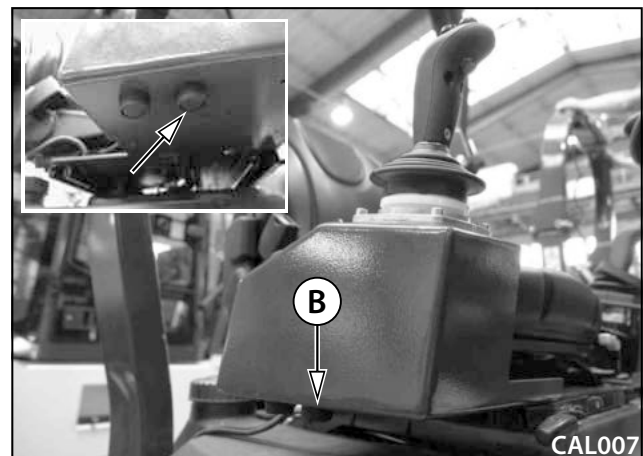


2.7 Machine operation and use

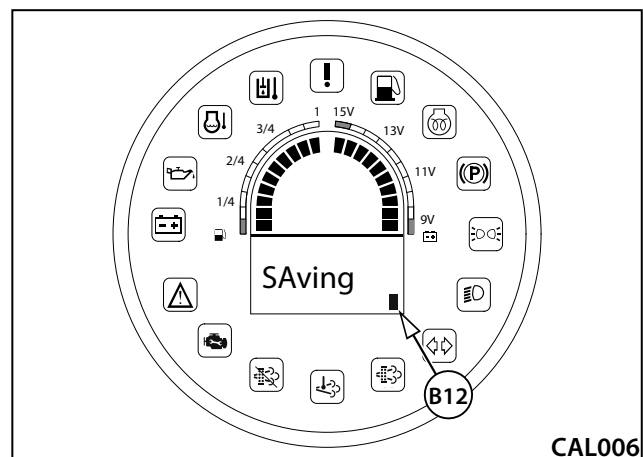
Select the parameter and press OK to confirm (12).



After all required parameters are set, set the B12 tab and press the calibration button (B) for 5 seconds.



While the button is held down, the display shows the "Saving" status.

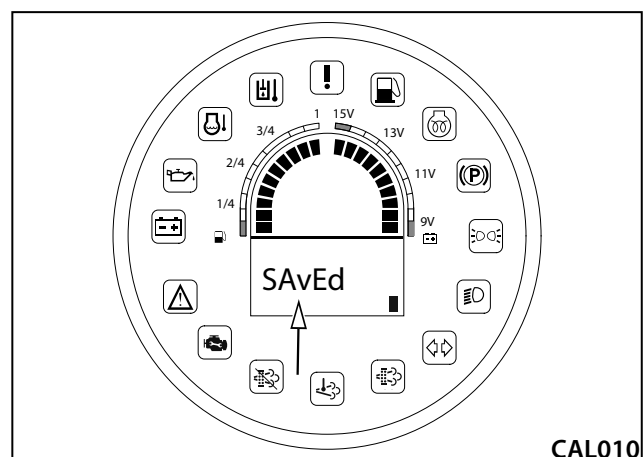


If the parameters are OK, the data saved and the display shows the "Saved" status.

If the set parameters are not OK, the display shows the "Err" status. The set parameters are not saved and the whole calibration must be repeated.

To complete the calibration, switch off ignition by turning the key in the ignition box to the "0" position.

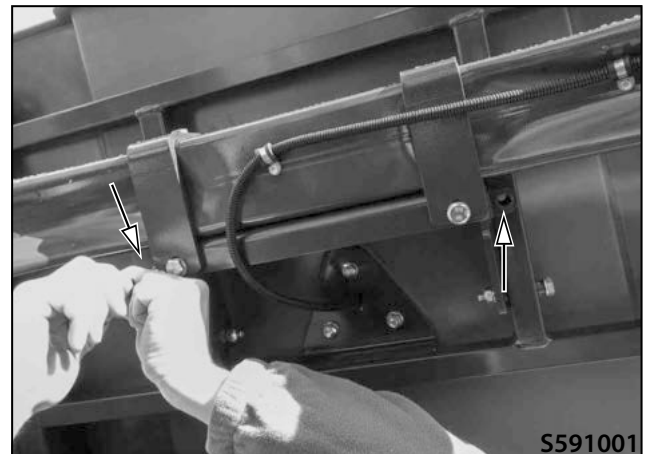
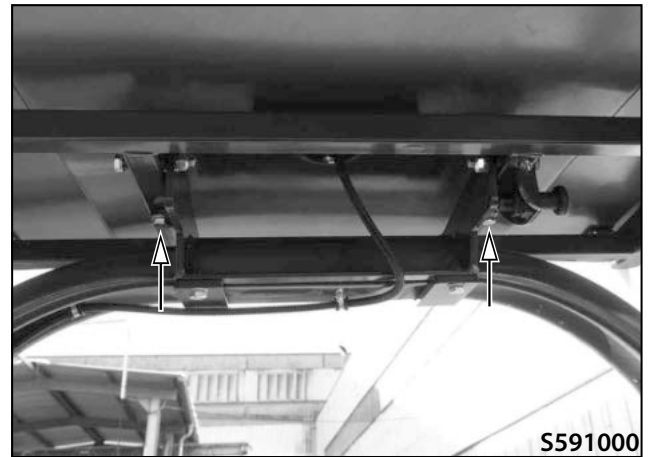
To exit the calibration mode without saving, switch off ignition or press the calibration button for 5 seconds when the tab is not set to B12.



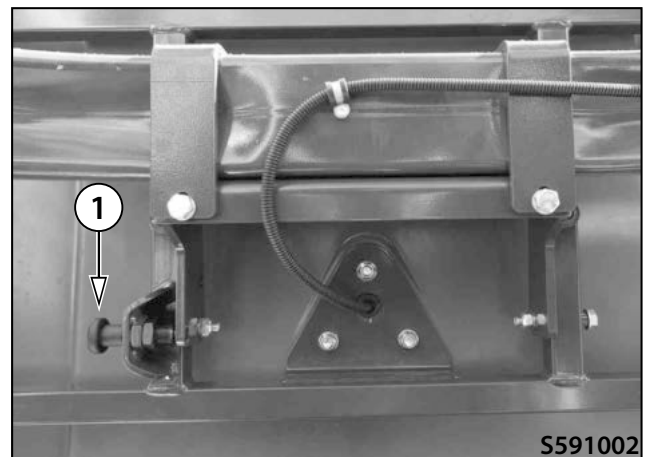
2.7.14 Lowering and raising of the plastic canopy

Lowering procedure

Remove the screws (2x) at the bottom of the plastic canopy.



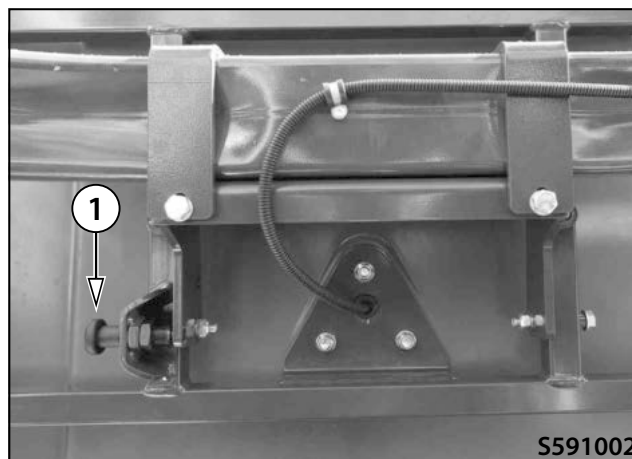
Release the canopy by pulling out the lever (1) slightly and lower the canopy.



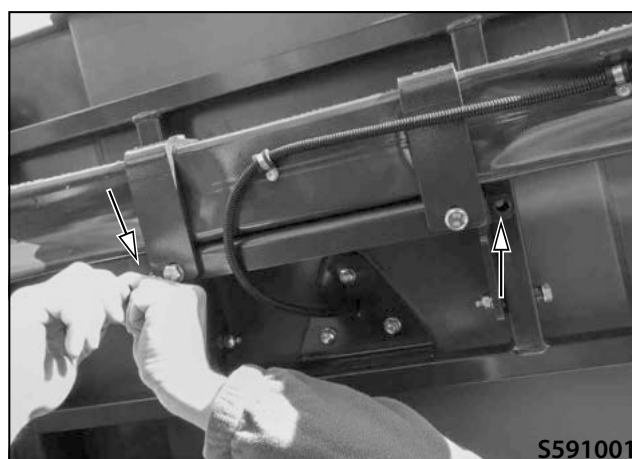
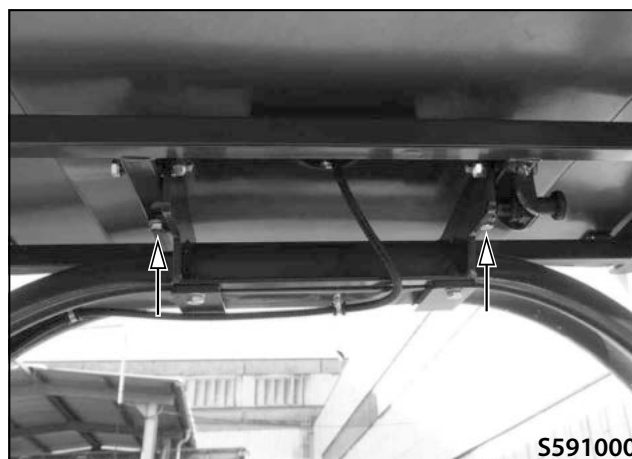
2.7 Machine operation and use

Raising procedure

Release the canopy by pulling out the lever (1) slightly and raise the canopy.



Mount the screws (2x) at the bottom of the plastic canopy.



- The machine can move on its own within the work site.



When driving, observe the safety measures applicable to the working site.

- The machine should be transported on a vehicle on public roads.



When transporting the machine on a vehicle, observe regulations applicable to the given territory.

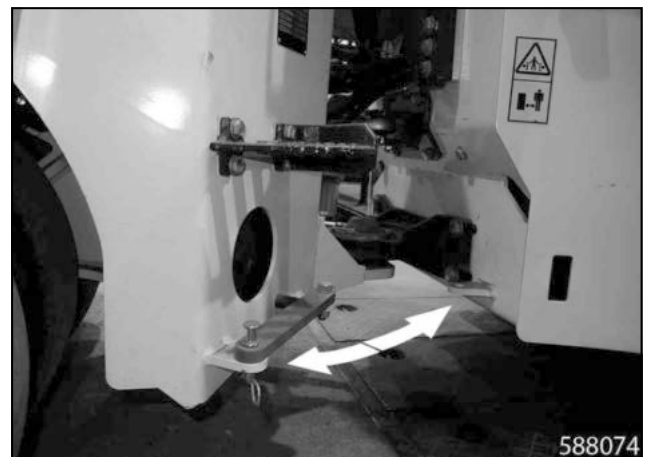
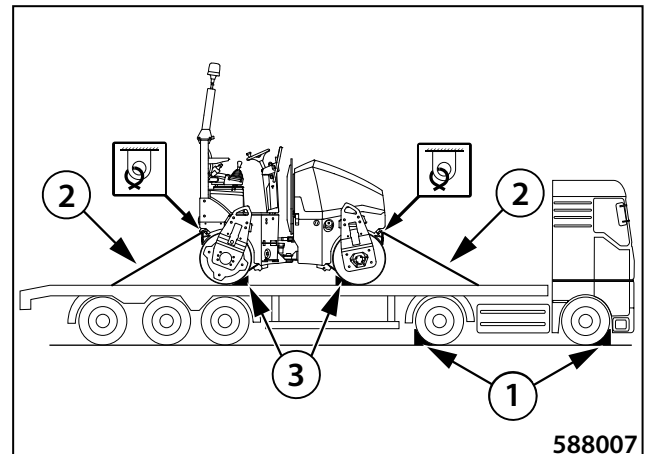


Use the loading mode to load the machine. Switch over the travel mode selector (4) to position "0".

When loading and unloading, the vehicle transporting the machine must be braked and mechanically protected against accidental movement using wedges (1).

The articulation joint of the machine must be secured with a strut against tilting on the vehicle.

The machine on the vehicle must be properly anchored and mechanically secured with the slings (2) in tie-down holes against longitudinal and lateral displacement as well as against overturning. The machine drums must be secured against accidental movement using wedges (3).



2.8 Machine transport

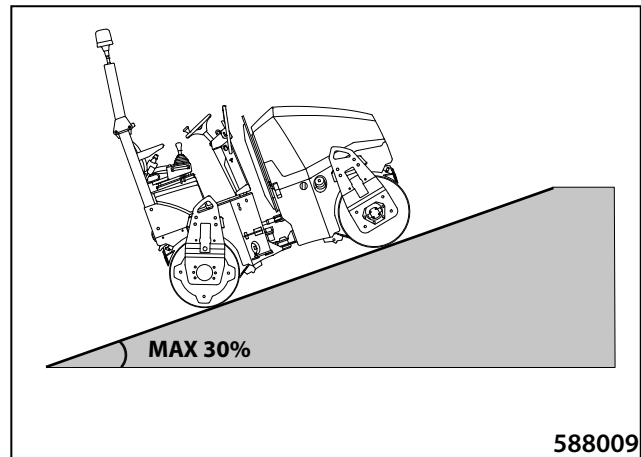
2.8.1 Loading the machine

Use a loading ramp or a crane to load the machine onto a mean of transport.

2.8.1.1 Loading the machine using a ramp

When loading the machine using a ramp, all safety regulations related to loading of the machine valid in the place of loading must be adhered to. The ramp must have an appropriate loading capacity, anti-slip surface and must be put on a flat surface. We recommend that you adhere to the BGR 233 regulation.

The maximum allowable inclination of the access ramp is 30%.



Use the loading mode to load the machine. Switch over the travel mode selector (4) to position "0".

When loading the machine, another person must be present to give hand signals to the machine operator for driving on the ramp. See the list of hand signals in chapter 2.1.6.

Pay increased attention when loading the machine. Improper handling can cause serious injury or death.



Non-adherence to the prescribed parameters of the access ramp may result in damage to the machine.

2.8.1.2 Loading the machine using a crane

For loading with a crane, the machine is provided with a 1-point or 4-point suspension.

Use a crane with a sufficient load capacity.

Observe relevant national safety measures while loading the machine using a crane.



Before lifting, the articulation joint of the machine must be secured with the strut 1 against tilting and secured with the pin 2 and the lock 3.



Observe safety regulations while loading and unloading!

Use a crane with a sufficient load capacity!

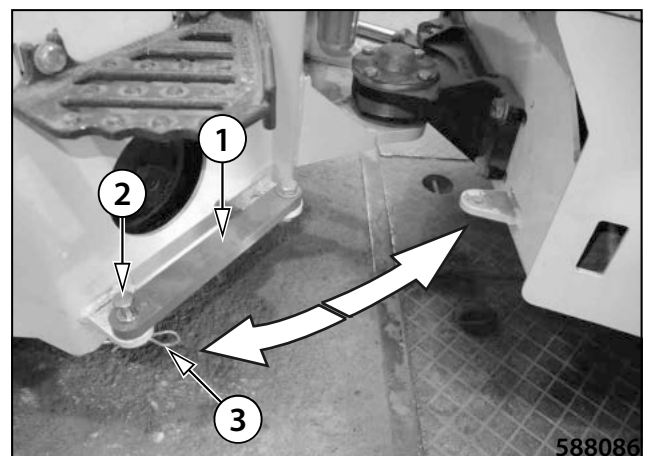
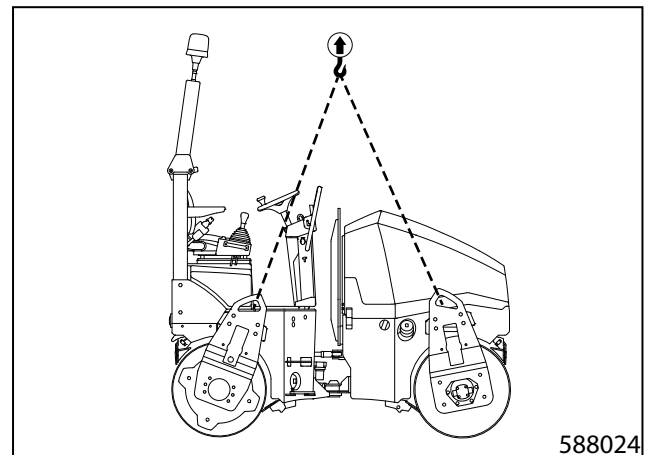
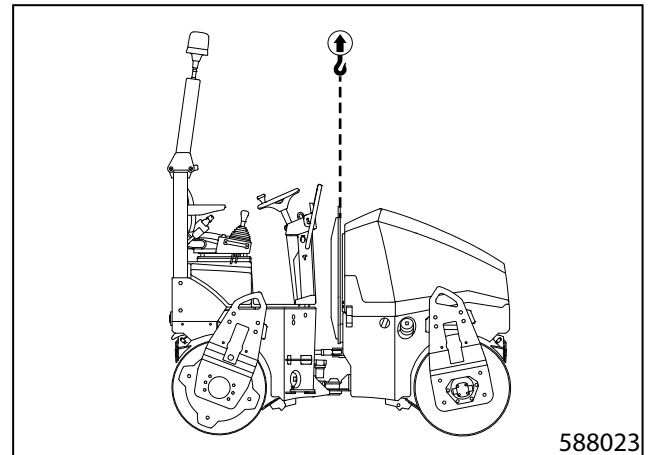
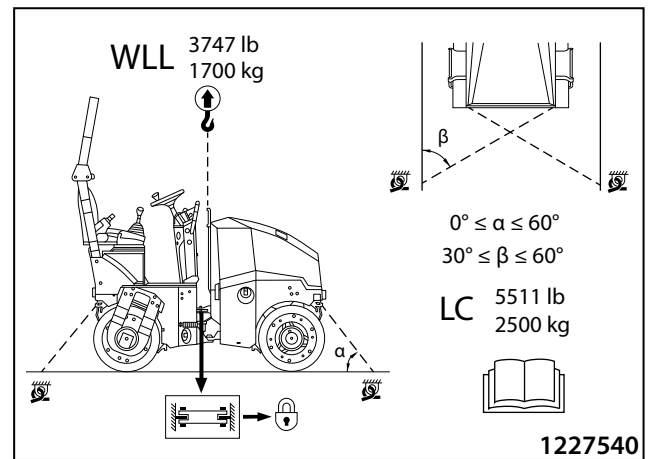
Use corresponding and unbroken hoisting slings with a sufficient load capacity!

The machine must be tied to the 4-point or 1-point suspension!

The maximum permissible working load for the one-point suspension is 2.7 tons.

Only a trained person (slinger) may carry out the tying of the machine!

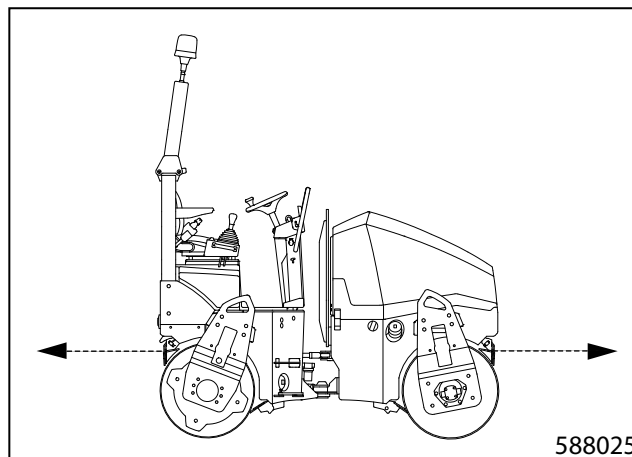
Do not enter under the lifted load!



2.9 Special conditions to use the machine

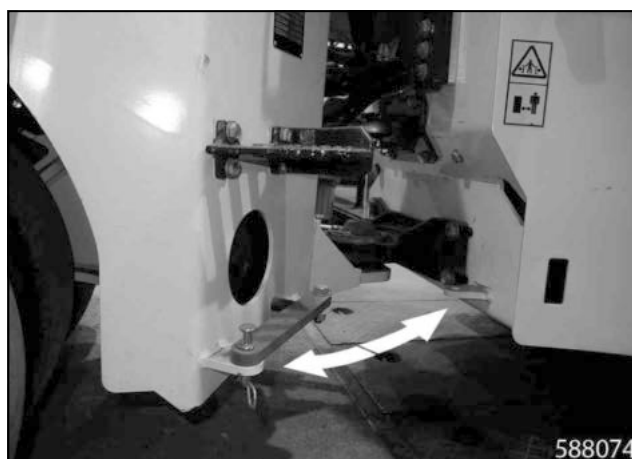
2.9.1 Towing the machine

The machine is provided with two towing lugs on the front frame and with two towing lugs on the rear frame.

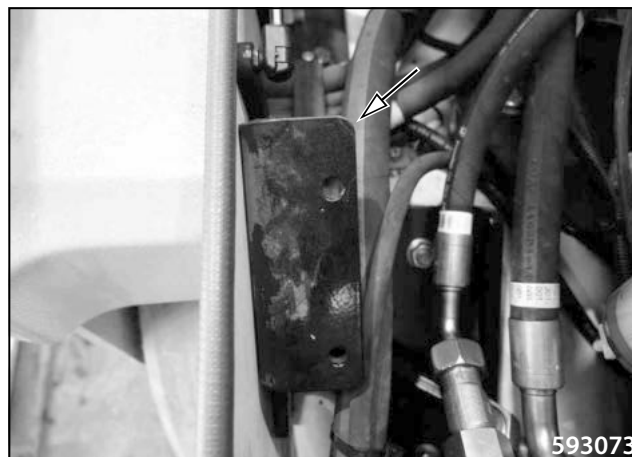


Releasing the machine brake

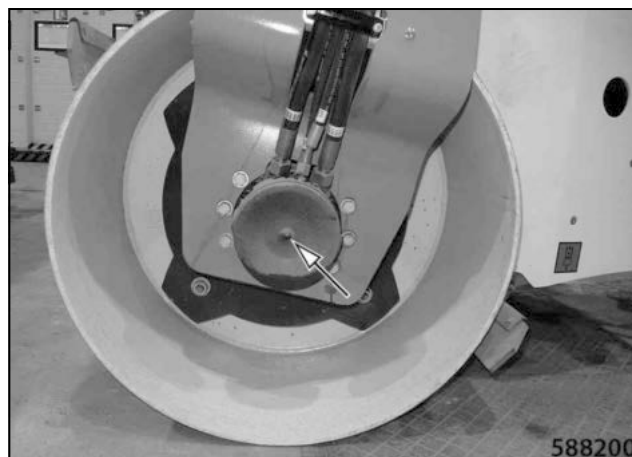
Secure the articulation joint of the machine against tilting.



Remove the brake discs.



Dismount protective lids on the front and rear travel hydraulic motor.



Mount a brake disc on the front drum travel hydraulic motor.
Tighten the screw by half a turn.

Note

Repeat the same procedure for the hydraulic motor of the rear drum travel.



When the towing is completed, return the machine into its original shape using the reverse procedure.



Towing procedure

- Secure the articulation joint of the machine against tilting.
- Attach the tow ropes or tow bars.
- Pull out the machine from the danger area.



The towed machine must be attached to both tow lugs.

For towing, use undamaged tow ropes or tow bars of a sufficient capacity $1.5 \times$ higher than the weight of the towed vehicle. Do not use a chain for the towing.

It is necessary to maintain the minimal angular deviation from the direction of towing. The maximum possible angular deviation is 30° .

The towing movement must be smooth. Do not exceed the towing speed by more than 1 km/hour (0.6 mph).

Tow the roller at the shortest distance possible – to rescue when it gets stuck or to remove when it is broken and obstructing. Do not tow for a distance exceeding 10 m (11 yd).

The towing machine should correspond with its size to the damaged machine. It must have a sufficient traction power (output), weight, and brake effect.

While towing downhill using a rope, another towing machine must be connected to the rear part of the damaged machine. In this way you can prevent an uncontrolled motion of the damaged machine.

No person may be on the towed machine!

Do not touch hot parts of the machine, there is a burn hazard!

2.9 Special conditions to use the machine

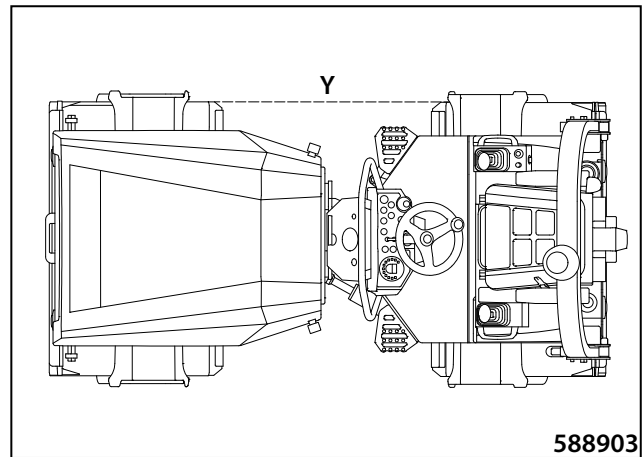
2.9.2 Drum offset

In-line position (Y)

In the in-line position, the machine drums are aligned in the same plane.

To adjust the drum from the offset position to the in-line position:

- Lock the strut (5) using the pin (6) and safety pin (7).
- Loosen the screws (3) and move the suspension of the connecting rod (1) to the left and then tighten the screws (3).
- Loosen the screws (4) and move the joint part (2) to the right and then tighten the screws (4).
- Unlock the strut (5) using the pin (6) and safety pin (7).

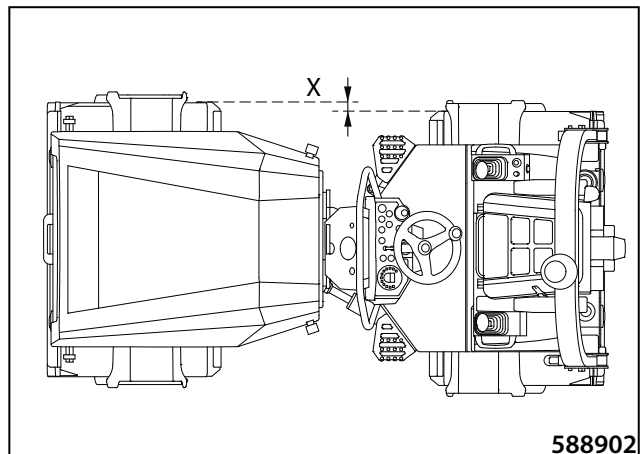


Offset position (X)

In the offset position, the front drum of the machine is offset to the right side from the rear drum. The drum offset is 40 mm.

To adjust the drums from the in-line position to the offset position:

- Lock the strut (5) using the pin (6) and safety pin (7).
- Loosen the screws (3) and move the suspension of the connecting rod (1) to the right and then tighten the screws (3).
- Loosen the screws (4) and move the joint part (2) to the left and then tighten the screws (4).
- Unlock the strut (5) using the pin (6) and safety pin (7).

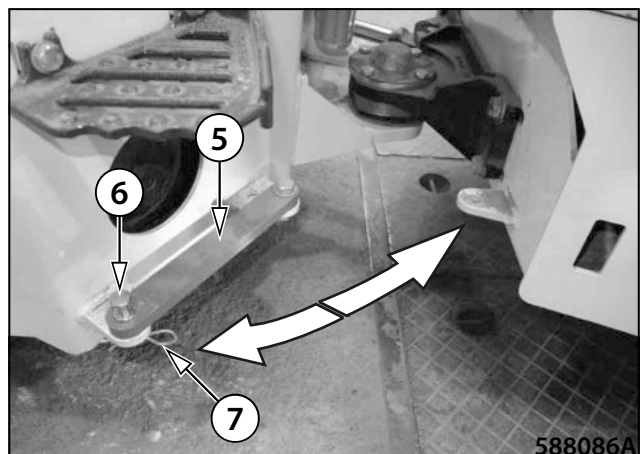
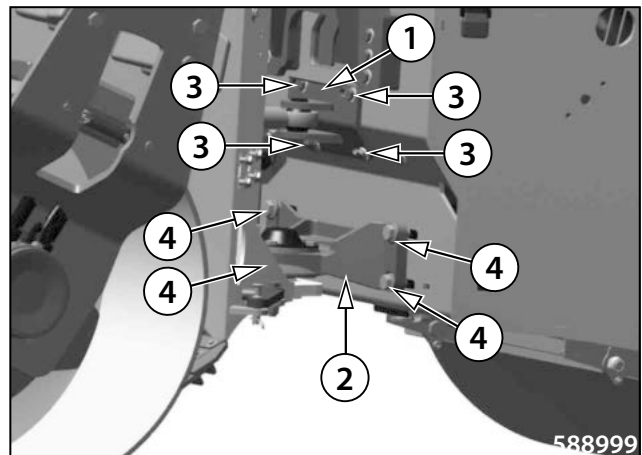


Danger of injury!

Carry out the drum offset when the engine is not running!
Lock the front and rear frame with the strut (5) in the joint area to prevent squeezing.

After the drum offset is completed, unlock the front and rear frame using the strut (5) in the joint area.

Make sure there are no persons in the dangerous area of the machine.



2.9.3 Machine operation during initial run period

When putting a new machine into operation or during the first 30 hours after a complete overhaul, do not run the machine at full power!

2.9.4 Machine operation at low temperatures

The compaction in the winter season depends on the content of fine particles and water in the soil being compacted. With the temperature dropping below the freezing point the soil becomes more solid and harder to compact.

At the temperatures below 0 °C (32 °F) it is possible to compact only dry soils (and loose stony materials), or carry out rapid compaction of non-frozen materials (before the soil gets frozen).

Prepare the machine for operation at low temperatures:

- Check concentration of the engine coolant.
- Replace the engine oil with the oil recommended for the range of ambient temperatures.
- Use hydraulic oil of the corresponding cinematic viscosity.
- Use a winter diesel.
- Check the battery for charging.

The good condition of the battery is a precondition for good starting under low temperatures. The machine can be used at full power only after the operating fluids have been heated to their operating temperatures.

2.9.5 Machine operation at higher temperatures and humidity

The engine power output decreases with the increasing temperature and air humidity. Considering that both of the factors reducing the engine power are independent on each other, it is possible to describe their impact as follows:

- Every 10 °C (18 °F) of the temperature rise means a power drop by up to 4% (at a constant humidity);
- Every 10% of the relative humidity rise means a power drop by up to 2% (at a constant temperature).

At outdoor temperatures when the hydraulic oil temperature is constantly about 90 °C (194 °F), we recommend you to replace the oil with the oil ISO VG 100 having the cinematic viscosity of 100 mm²/s at 40 °C (104 °F).

2.9.6 Machine operation at higher altitudes

With the increasing altitude, the engine power output decreases as a result of the lower atmospheric pressure and specific density of the incoming air.



The engine power depends on the environment, in which the machine is working.

2.9 Special conditions to use the machine

2.9.7 Machine operation in dusty environment



While operating in a very dusty environment, shorten cleaning and replacement intervals of air filter cartridges and shorten cleaning intervals of coolers.

The recommended cleaning interval is once a week.

2.9.8 Driving with vibration on compacted and hard materials

When the machine works with vibration on hard materials (e.g. loose stony materials) or materials with a high degree of compaction, the drum can lose its contact with the compacted material (so-called vibro stroke). Due to this condition, the transfer of vibrations to the machine frame and to the driver's stand increases. It can be partly removed by increasing the travel speed or by changing the vibration parameters of the machine (using a smaller amplitude).

If it is necessary to work with the machine in conditions when the operator can be exposed to higher vibrations, the machine user must modify working procedures to protect the driver's health.

Note

When driving with vibration on a different background material than specified in the Specification manual, the emission values of the vibration acceleration will be different – Noise and vibration emissions.

3 MAINTENANCE MANUAL

3.1 Safety and other measures during maintenance of the machine

3.1.1 Safety during machine maintenance

Carry out lubrication, maintenance and adjustment as follows:

- By professionally trained personnel;
- according to safety instructions given in the operating manual
- in intervals stated in the lubrication chart according to worked hours
- On the machine standing on a flat and solid surface and secured against movement (with scotch blocks), always with the engine off, the key removed from the ignition box and the wiring disconnected;
- At cold machine parts;
- after the machine, lubrication points and maintenance points have been cleaned
- using suitable undamaged tools,
- By replacing parts with new original parts according to the spare parts catalogue;
- By providing sufficient lighting of the entire machine during poor visibility and at night;
- By reinstalling all removed covers and safety elements after the work is completed;
- By retightening screw connections to the specified tightening torque and checking the connections for leakage;
- After the operating fluids are heated – beware of burns – use only recommended media.



After the adjustment or maintenance is completed, check all safety devices for proper operation!

3.1.2 Fire protection when operating fluids are changed

- Considering the fire danger, the flammable liquids used on the machine are divided into the following hazard classes:
 - II hazard class – diesel fuel
 - IV hazard class IV – mineral oils, lubricating greases
- The oil change point must be where it cannot interfere in explosion or fire hazard areas.
- It must be identified by “No smoking” and “No open flame” plates and signs.
- The handling area must be dimensioned so that it can catch a volume of the flammable liquid equal to the capacity of the biggest vessel, transport container.
- It must be equipped with portable fire extinguishers.
- For handling oils and diesel fuel, use vessels such as metal barrels, jerry cans and sheet-metal cans.
- The transport containers must be properly closed during storage.
- The containers must be provided with one hole, always stored with the hole up and secured so that their content cannot flow out and drip off.
- Vessels must be marked with non-removable writings showing the contents and flammability classes.

3.1 Safety and other measures during maintenance of the machine

3.1.3 Environmental and hygiene principles

When operating or maintaining the machines, the user is obliged to follow general principles of health and environment protection according to laws, ordinances and regulations in individual territories when the machine is used.

Hygiene principles

- Petroleum products, cooling system fluids, battery fluids and coating compounds including thinners are substances harmful to health. Workers coming into contact with the above products during operation or maintenance of the machine are obliged to follow general principles of their own health protection and comply with safety and hygienic manuals made by manufacturers of the products.
- In particular we draw your attention to the following:
 - protect your eyes and skin while working with the batteries
 - protect your skin while handling petroleum products, coating compounds and coolants
- wash your hands properly after finishing the work and before eating, treat your hands with a suitable reparation cream
- follow instructions given in this manual.
- Always store petroleum products, cooling system fluids, battery fluids and coating compounds including thinners and also cleaners and preservative agents in their original and properly labelled containers. These materials are not allowed to be stored in unlabelled bottles or in any other containers considering the possible risk of confusion. Possible confusion with foodstuffs or beverages is very dangerous.
- If by accident the skin, eyes or mucous membrane is stained or if you breathe in the vapours of such products, apply immediately the principles of the first aid. In case of accidental ingestion of these products, immediately seek medical help.
- While working with the machine when it is provided with a platform or the cab windows are open, always use ear protectors of suitable type and version.

Environmental principles



The operating fluids of the individual systems of the machine and also some of its parts after discarded (dis-mounted, exchanged) become hazardous wastes with dangerous properties for the environment.

- This category of waste products includes in particular:
 - organic and synthetic lubricating materials, oils and fuels;
 - coolants;
 - battery fluids and batteries;
 - cooling system media;
 - cleaning and preservative agents;
 - all dismantled filters and filter cartridges,
 - all used and discarded hydraulic or fuel hoses, rubber-metal elements and other parts of the machine contaminated by the above mentioned products.



It is necessary to treat the above mentioned materials and parts after they have been discarded in accordance with relevant national regulations valid for protection of the environment and in compliance with regulations of the health protection.

3.2 Specification of operating fluids

3.2.1 Engine oil



The engine oil is specified according to the performance and viscosity classification.

Performance classification according to

API (AMERICAN PETROLEUM INSTITUTE)

ACEA (ASSOCIATION DES CONSTRUCTEURS EUROPÉENS DE AUTOMOBILE)

Viscosity classification

To determine the SAE (Society of Automotive Engineers) viscosity class, the ambient temperature and type of operation where the machine is used are decisive.

Use of permissible oils according to API: CF, CF-4, CG-4, CH-4, CI-4

SAE 15W-40 year-round

If a fuel with a high sulphur content is used, use only CF oil.

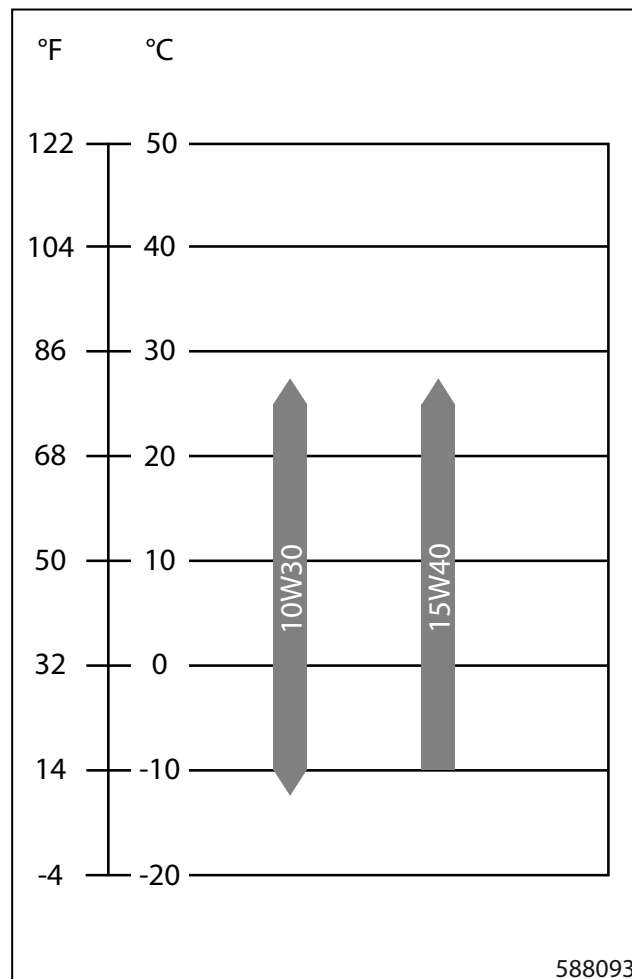
Note

Exceeding the lower temperature limit does not result in damage to the engine; it can only cause some starting difficulties.

It is recommended that universal multi-range oils are used to avoid the necessity of oil changes due to changes of ambient temperature.

For easy starts at the temperatures below 0 °C (32 °F), the engine manufacturer recommends the SAE 10W-30 oil.

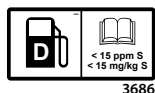
Viscosity diagram



Exceeding the upper temperature limit, considering the reduced lubricating capabilities of the oil must not last for long.

3.2 Specification of operating fluids

3.2.2 Fuel



Diesel oil is used as fuel for the engine:

- EN590
- ASTM D975: 1D S15, 2D S15

Note

Do not use fuels with a sulphur content exceeding 1 % (10000 ppm).

Use fuels with a sulphur content of 0.1 % (1000 ppm).

When a fuel with a sulphur content exceeding 0.5–1 % (5000–10000 ppm) is used, shorten the engine oil and filter change interval by half.



At ambient temperatures below 0 °C (32 °F), use winter diesel fuel.

Mixing diesel with special additives is forbidden.

3.2.3 Coolant



The coolant specification must meet requirements of:

- SAE J1034
- SAE J814c



To fill the cooling circuit, use the coolant in the mixing ratio of 50%/50% with high-quality water (thermal protection up to -37 °C).

Change the coolant every 2 years at the latest.

Note

The machines are filled with a cooling solution with the Bantleon Avia Antifreeze NG coolant, specification SAE J 1034 at the manufacturer's during the production.

It is a coolant containing silicates based on monoethylene glycol. It does not contain phosphates, nitrates, amines and borates.

There is an Avia NG label placed where the coolant is to be filled into the machine.



Refill the cooling circuit with the same or a completely miscible coolant of the required specification.

If the use of a different, immiscible coolant is necessary, the cooling circuit must be completely drained and cleaned with clean water repeatedly, at least 3 times. However, it is not allowed to use a coolant of a different specification than stated by the engine manufacturer.

The coolant protects the cooling system from freezing, corrosion, cavitation, overheating etc.

It is forbidden to operate the machine without coolant even for a short time.

It is forbidden to use a coolant of a different than prescribed specification and base. The engine and the cooling system can get damaged and the warranty lost.

Always check the ratio of antifreeze cooling agent in the coolant with a refractometer before the winter season starts.

Water quality

Do not use hard water with a higher content of calcium and magnesium, which brings calculus formation, and with a higher content of chlorides and sulphates, which causes corrosion.

The maximum content of compounds of calcium and magnesium is 170 milligrams – hardness of water.

The maximum content of compounds of chlorine is 40 milligrams.

The maximum content of compounds of sulphur is 100 milligrams.

Safety instructions:

- 1) Protect your hands with protective gloves.
- 2) In case of ingestion immediately seek medical treatment.
- 3) In case of contact with skin or clothing immediately wash the affected area with clean water.
- 4) Do not mix different types of coolants. The mixture can cause a chemical reaction with formation of harmful substances.

3.2 Specification of operating fluids

3.2.4 Hydraulic oil



For the hydraulic system of the machine, it is necessary to use only high-quality hydraulic oil grades according to ISO 6743/HV (equal to DIN 51524 part 3 HVLP).

Fill the machines with hydraulic oil that has cinematic viscosity of 46 mm²/s at 40 °C (104 °F) ISO VG 46. This oil is the most appropriate to be used within the widest range of ambient temperatures.

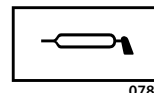
Synthetic hydraulic oil

The hydraulic system can be filled with synthetic oil, which if leaks occur will be degraded completely by micro-organisms present in water and soil.



Please consult always with oil manufacturer or dealer any switching from mineral oil to synthetic one or mixing the oils of various brands!

3.2.5 Lubricating grease



To lubricate the machine you must use plastic grease containing lithium according to:


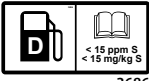

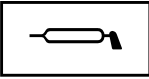



ISO 6743/9 CCEB 2

DIN 51 502 KP2K-30

3.2.6 Emulsion



For sprinkling the tyres, use anti-adhesive emulsion of RHO-DOSIL EMULSION E1P with water in the mixing ratio of 1.5:100.




Part	Fluid type	Fluid quantity l (gal US)	Brand
Engine	Engine oil according to Chapter 3.2.1.	7 (1.8)	 2412
Fuel tank	Fuel according to Chapter 3.2.2.	35 (9.3)	 3686
Hydraulic system	Hydraulic oil according to Chapter 3.2.4.	28.5 (7.5)	 2158
Steering joint bearings, stirrup bearings, steering swivel pins, suspensions	Lubricating grease according to Chapter 3.2.5.	as required	 0787
Cooling system	Coolant according to the chapter 3.2.3.	6.7 (1.8)	 2152
Sprinkling tank	Water	190 (50.2)	 AMN59
Emulsion sprinkling tank	Emulsion according to Chapter 3.2.6	12 (3.2)	 AMN242

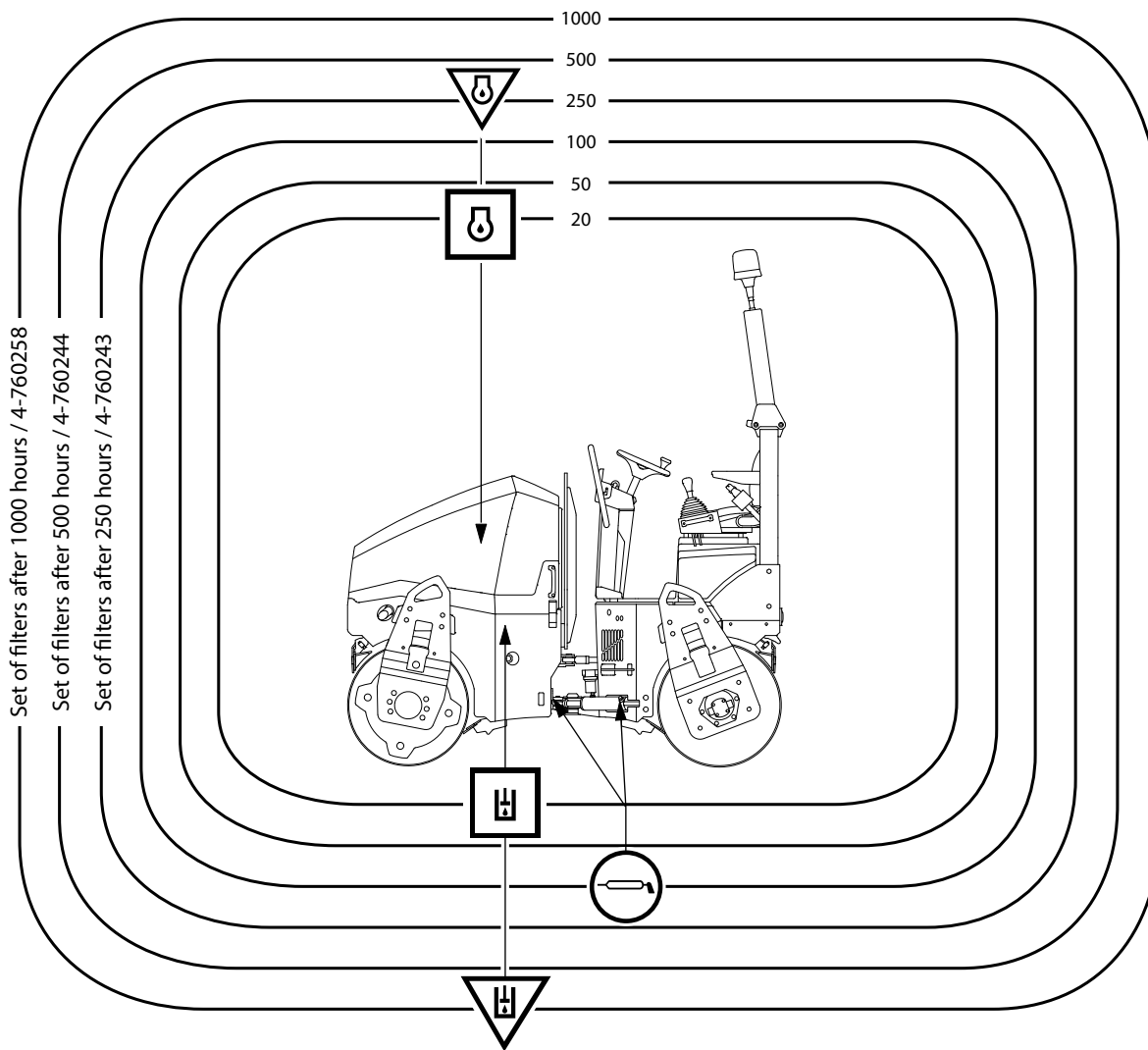
3.4 Lubrication and maintenance chart




Every 20 hours of operation (daily)	
3.6.1	Fuel check
3.6.2	Engine oil check
3.6.3	Engine coolant check
3.6.4	Checking the oil in the hydraulic tank
3.6.5	Hydraulic oil cooler cleaning
3.6.6.	Air filter check
3.6.7	Sprinkling emulsion level check
3.6.8	Sprinkling tank refilling
3.6.9	Scraper adjustment
3.6.10	Inspection of warning and checking devices
3.6.11	Engine leakage check
3.6.12	Check of the fan and engine belt for condition
3.6.13	Brake test
3.6.14	Check of the tightness of the fuel and hydraulic system
Every 50 hours of operation	
3.6.15	Check of hoses and clips
3.6.16	Battery inspection
After 50 hours of operation	
3.6.22	Engine oil change *
Every 100 hours of operation (weekly)	
3.6.17	Air filter cleaning
3.6.18	Cleaning the water separator on the fuel filter
3.6.19	Machine lubrication
3.6.20	Tyre pressure check
Every 250 hours of operation (every 3 months)	
3.6.21	Fuel filter replacement
3.6.22	Engine oil change *
3.6.23	Checking the hoses of the engine cooler for wear and mounting
3.6.24	Checking the hoses and clips for mounting
3.6.25	Sprinkling filter cleaning
3.6.26	Engine intake pipe inspection

Every 500 hours of operation (every 6 months), but at least once a year	
3.6.27	Fuel tank cleaning
3.6.28	Electrical installation inspection
3.6.29	Replacement of the fuel separator filter cartridge
3.6.30	Valve clearance check and adjustment
3.6.31	Engine cooler cleaning
3.6.32	Check of rubber-metal elements of the engine cooler
After 500 hours of operation	
3.6.33	Hydraulic oil change and filter replacement **
Every 1000 hours of operation (yearly)	
3.6.33	Hydraulic oil change and filter replacement **
3.6.34	Replacement of air filter cartridges
3.6.35	Damping system check
3.6.36	Swinging support check
3.6.37	Articulation joint check
Every 2000 hours of operation (every 2 years)	
3.6.38	Engine belt replacement
3.6.39	Engine coolant change
3.6.40	Replacement of hoses of the cooling system
3.6.41	Replacement of rubber-metal elements of the engine cooler
3.6.42	Replacement of hoses of the fuel system
3.6.43	Replacement of suction hoses
Maintenance as required	
3.6.44	Gas strut replacement
3.6.45	Cleaning the water separator
3.6.46	Cleaning the water tank
3.6.47	Cleaning the machine
3.6.48	Draining water from the sprinkling circuit before the winter season
3.6.49	Fuel system venting
3.6.50	Charging of the battery
3.6.51	Checking the screw connections for tightening
<p>* First after 50 engine hours.</p> <p>** First after 500 engine hours.</p>	

LUBRICATION AND SERVICE PLAN

	INSPECTION
	LUBRICATION
	REPLACEMENT



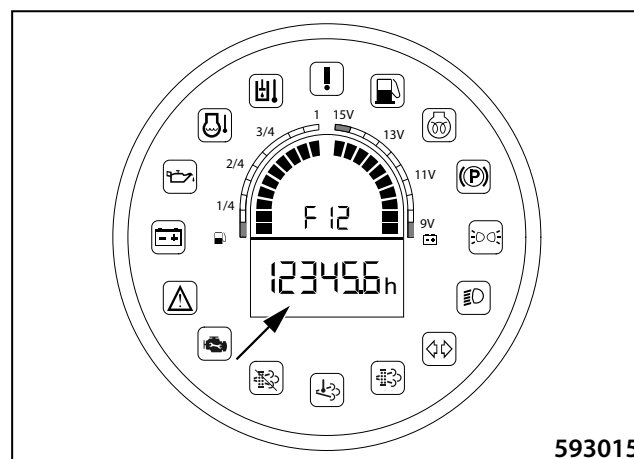
	Engine oil:	SAE 15W/40	API CF-4
	Hydraulic oil:	ISO VG 46 HVLP	
	Lubricating grease:	ISO 6743/9	DIN 51 502

593074A

3.6 Lubrication and maintenance operations

The lubrication and maintenance chart contains tasks and instructions that must be followed at certain intervals. If the table contains two intervals of mandatory maintenance, e.g. every 1000 hours of operation or 1 year, always use the interval that occurs first.

The worked hours can be determined by daily reading of the data on the worked hours counter.



This manual includes only basic information about the engine; the other data are given in the operation and maintenance manual, which is a part of documentation supplied together with the machine.



Follow also instructions given in the engine operating and maintenance manual!

Retighten removed or loosened bolts, plugs, threaded joints in the hydraulic system, etc. with the tightening torque specified in tables in the chapter 3.6.51 unless a different value is given for the respective operation.



Carry out maintenance works with the machine placed on a flat, solid surface and secured against any spontaneous movement, always with the engine off, and the key removed from the ignition box and with the disconnected electrical installation (unless required otherwise).

After the first 50 hours of operation of the new machine or after its general overhaul, carry out the following operations according to Chapter:

3.6.22 Engine oil change

After the first 500 hours of operation of the new machine or after its general overhaul, carry out the following operations according to Chapter:

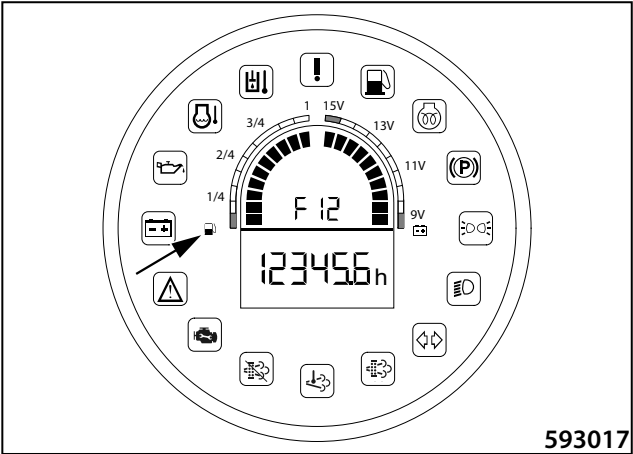
3.6.33 Filter hydraulic oil change

3.6 Lubrication and maintenance operations

Every 20 hours of operation (daily)

3.6.1 Fuel check

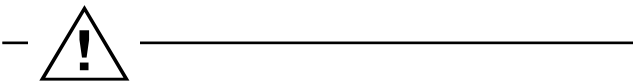
Check the fuel level on the dashboard and refill if necessary.



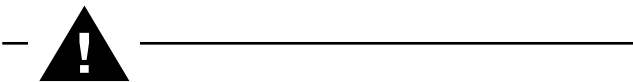
Clean the tank cap and the filler neck.
Unlock the lock and remove the cap.
Refill the tank up to the bottom line of the filler neck.

Note

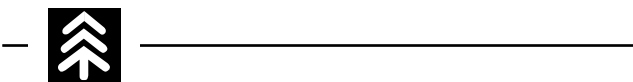
The fuel tank volume is 35 l (9.3 gal US).



Fill up the same fuel type; see Chap. 3.2.2.
Check the fuel tank and the fuel circuit for leaks.



Do not smoke and do not use open flame while working.
Do not refill the fuel when the engine is running.



Stop the fuel soaking into the ground.

3.6.2 Engine oil check

Wait for about 5 min. until the oil flows down into the engine sump.

Take out the oil dipstick, wipe it, insert fully back and take it out again to read out the oil level.



Keep the level within the range of gauge marks imprinted in the dipstick. The lower mark shows the lowest possible oil level, the upper mark indicates the highest.

Refill the oil as required.

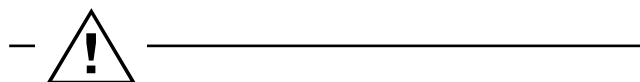
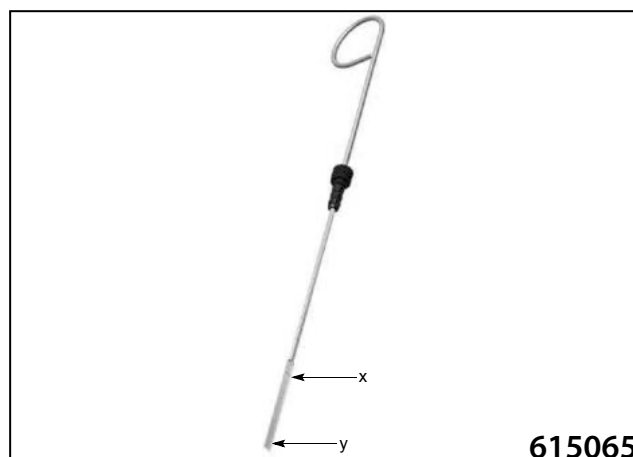
Refill engine oil through the filler neck.

Check the engine for leaks and remove the cause.

Check the engine for damaged and/or missing parts and for changes in appearance.

Note

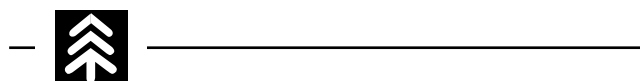
The total volume of oil in the engine is 7 litres (1.85 US gal).



Do not use the engine unless the oil level in the engine is correct.

Carry out the check after the oil has been cooled down.

Fill up the same oil type; see Chap. 3.2.1.



Stop the oil soaking into the ground.

3.6 Lubrication and maintenance operations

3.6.3 Engine coolant check

Let the coolant cool below 50 °C (120 °F).

Do visual inspection of the level on the expansion tank. The fluid level must be between the upper (MAX) and the lower (MIN) mark.

Refill the coolant as required. Carry out the refilling through the filler neck.

Note

The total volume of coolant in the engine is 6.7 l (1.8 US gal).



Remove the filler cap only after the temperature of the engine coolant drops below 50 °C (120 °F). If you remove the plug at a higher temperature, there is a risk of steam or coolant scalding due to an internal overpressure.



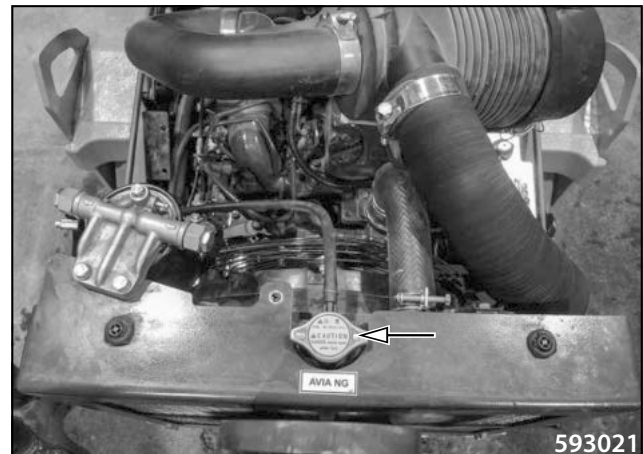
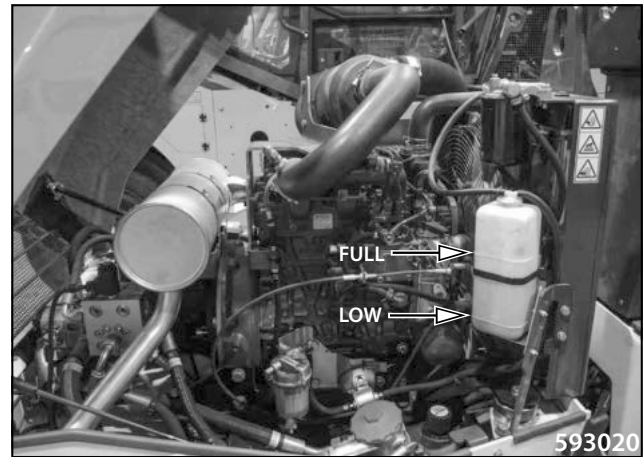
The level must not drop below the lower mark.

Refill only with a coolant containing antifreeze agents on the same basis according to Chapter 3.2.3.

Do not use any additives to repair the cooling system leakage into the engine coolant!

Do not refill cold coolant into a hot engine. There is a danger of damage to the engine castings.

In case of larger losses, find out where the cooling system leaks and repair the cause.



3.6.4 Checking the oil in the hydraulic tank

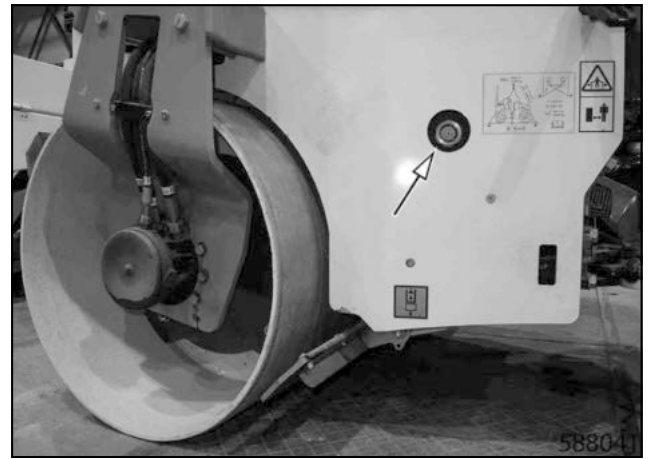
Check the hydraulic oil level always when the engine is cold but running.

Put the machine on a flat terrain.

Let the engine run at idle.

Check the oil level in the inspection hole.

The ideal oil level is when the gauge is half-full.



Hydraulic oil refilling

Take off the ventilation filter (1) from the filler neck.

Refill the required quantity of hydraulic oil.

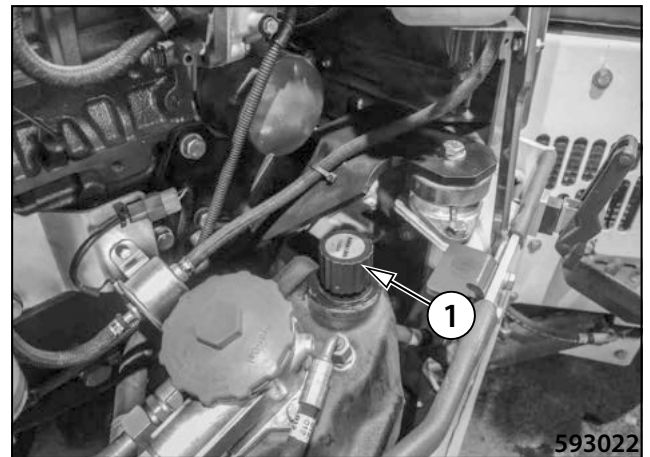
Screw in the ventilation filter (1) back in place.



Always lubricate the O-ring before screwing it in place.

Check the oil when it is cooled down.

Fill up the same oil type; see Chap. 3.2.4.



Stop the oil soaking into the ground.

3.6 Lubrication and maintenance operations

3.6.5 Cleaning the hydraulic oil cooler

Check the cooling fins that they are not dirty or clogged.

Clean the fins with water or blow through with compressed air.

When working in a very dusty environment, carry out the cleaning daily. The cooler fouling results in reduced cooling effect and increased temperatures of the engine coolant and of the hydraulic oil.



Never clean the cooler with high pressure (e.g. with strong water jets).

When the cooler is contaminated by petroleum products, use a cleaning agent and proceed according to the manufacturer's instructions! Find out the cause of contamination!

Do not smoke while working!

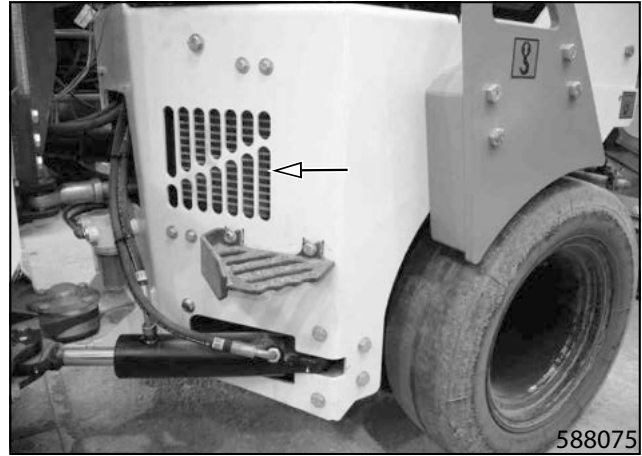
Check the hydraulic circuit for leakage.



Follow environmental standards and regulations when cleaning the machine!

Clean the machine in a workplace equipped with a catching system of cleaning agents to avoid contamination of the soil and water resources!

Do not use forbidden cleaning agents!



3.6.6 Air filter check

Check that the suction hole is not dirty.



Clean the exit slit and squeeze to remove any dust trapped.

Note

Any dust trapped in the dust valve is automatically emptied during operation of the machine.



Replace the dust valve immediately if it is damaged!



3.6 Lubrication and maintenance operations

3.6.7 Sprinkling emulsion level check

Open the lid.

Remove the tank cap.

Refill the emulsion.



Fill up the same emulsion type; see Chap. 3.2.6.



Stop the emulsion soaking into the ground.



3.6.8 Sprinkling tank refilling

Check the water level in the tank in the inspection hole.



Open the tank cap and refill with clean water.



Before the winter period, drain the water from the water tank and from the sprinkling system!



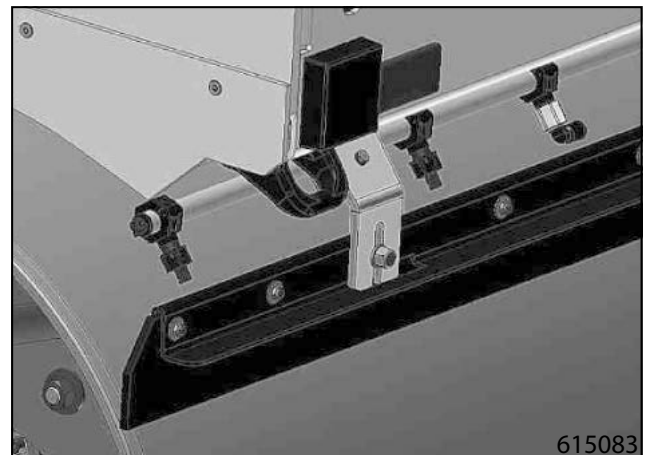
3.6.9 Scraper adjustment

Fixed scrapers (optional equipment)

Loosen the screws and move the scraper so that it is in contact with the drum.

Hinged scrapers (optional equipment)

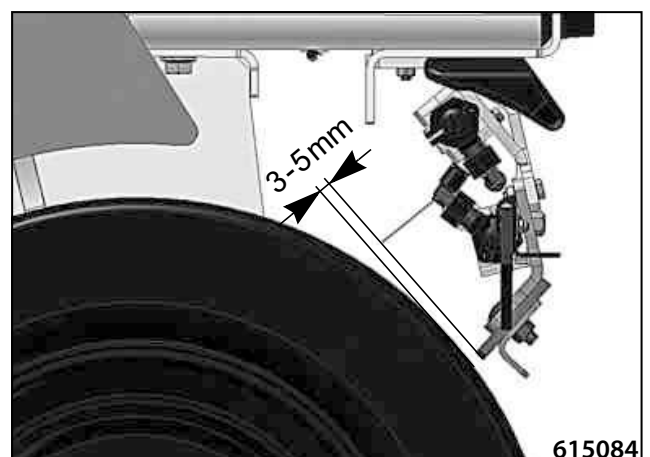
The hinged scrapers can be lifted and lowered manually. Before driving adjust the drum scrapers and move the scraper so that it is in contact with the drum.



Scrapers for the wheel axle

Adjust the tyre scrapers so that there is a gap of 3–5 mm between the scraper and the tyre.

Never wipe off the emulsion.



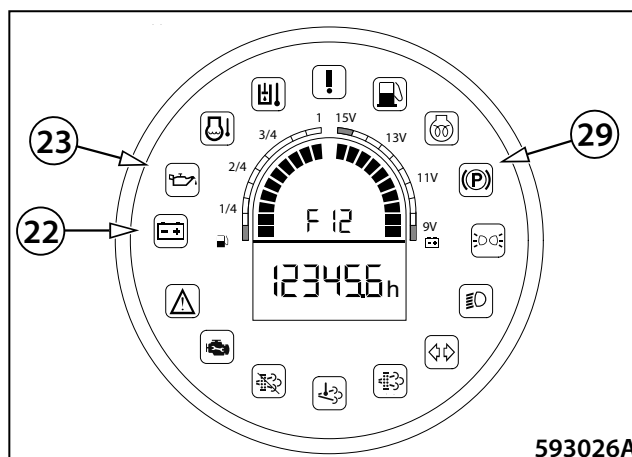
3.6 Lubrication and maintenance operations

3.6.10 Inspection of warning and checking devices

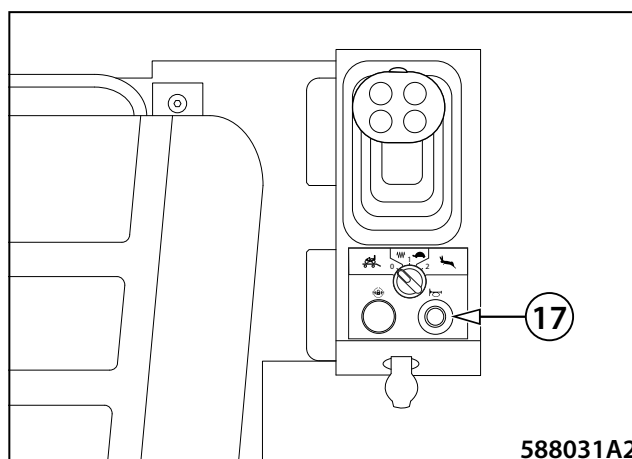
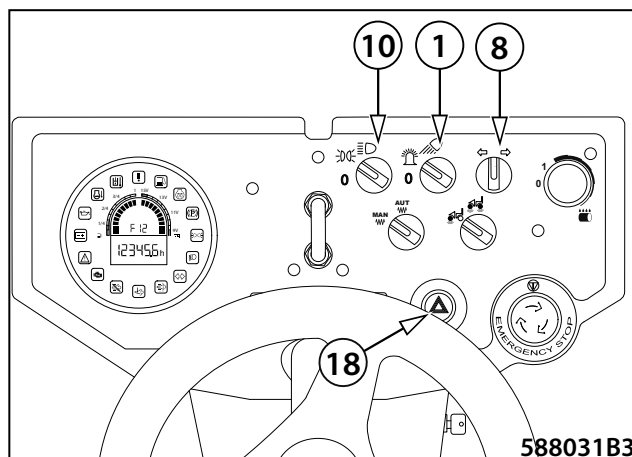
Turn the key in the ignition box to the position I.



The indicator lamps for battery charging (22), engine lubrication (23) and parking brake (29) will light up.

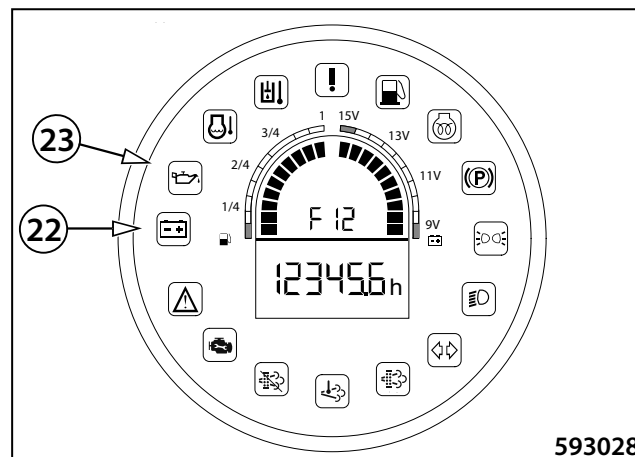


Then check the switches (1, 7, 9, 15, 16) for operation.



Start the engine according to Chapter 2.7.1.

After the start, the indicator lamps for battery charging (22) and engine lubrication (23) must go off.



Move off the machine:

After the travel control (11) is moved through the neutral position "N", the brake indicator lamp (29) goes out.

Emergency brake button function:

Let the machine stay on the spot and set the travel control to the neutral position (N).

Press the emergency brake button (6).

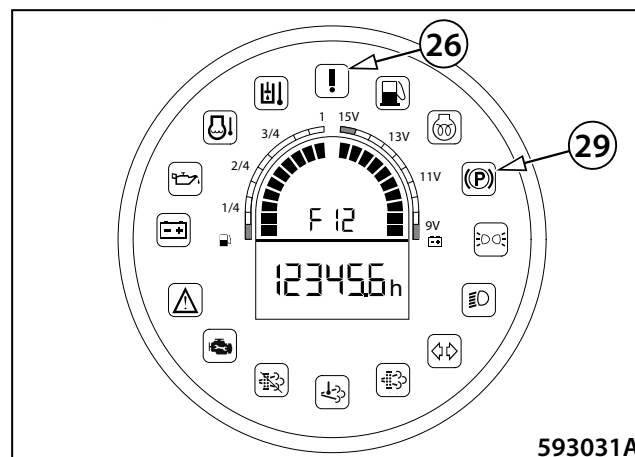
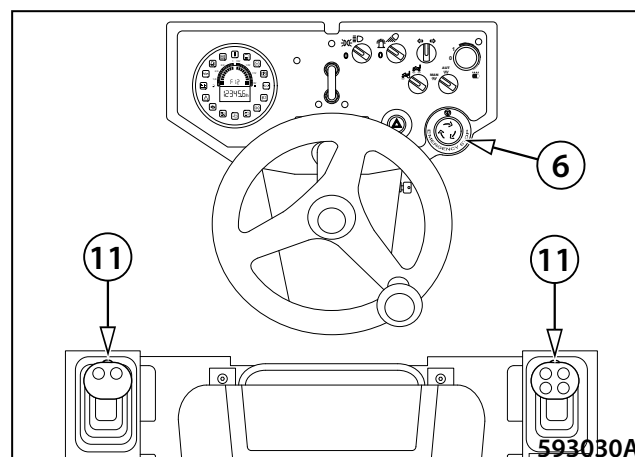
The brake is enabled and the engine stalls.

The emergency stop indicator lamp (26) and the parking brake indicator lamp (29) light up.

Turn the emergency brake button (6) in the direction of arrows.

Set the travel control (11) to the zero position (0) and the engine speed control (3) to the idle speed position.

Now you can start the engine again.



Use the audible alarm to announce the engine start!

Before starting the engine, check that nobody is endangered by the engine start!

Use the warning horn to signal the engine starting and check that nobody is endangered by starting the engine!

Make sure that the area in front of and behind the machine is free and no persons are present there!



During operation, check the instruments and indicator lamps continuously.

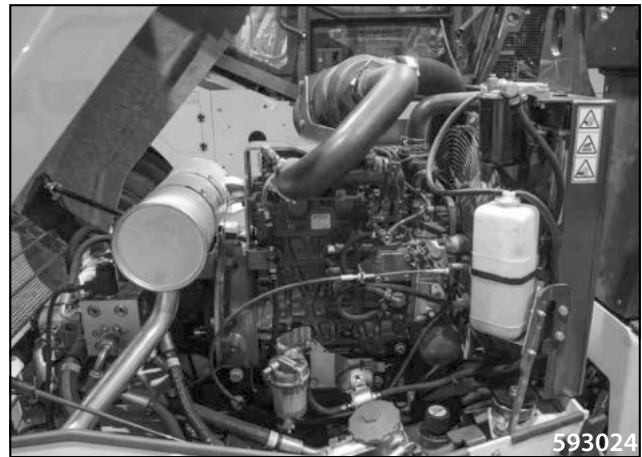
Promptly repair any failures!

3.6 Lubrication and maintenance operations

3.6.11 Engine leakage check

Visually check the engine and the engine compartment for oil leakage.

Remove the identified defects.



3.6.12 Check of the fan and engine belt for condition

Fan wear check

Check the fan visually. Replace the fan if damaged (e.g. missing parts of materials, cracks, shape changes, etc.).

Fan

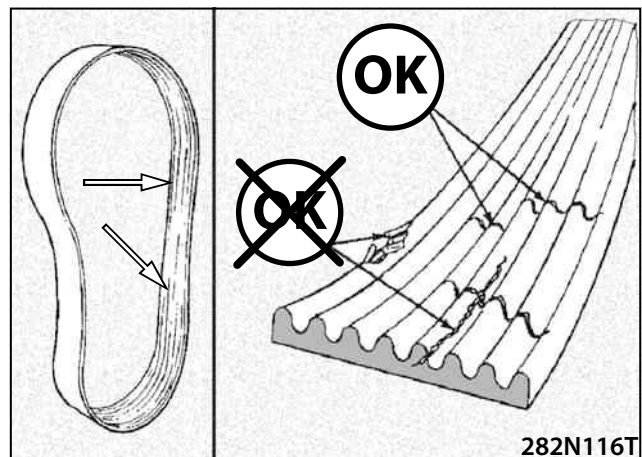
Order number: 1448212



Belt wear check

Visually inspect the belt.

Cracks perpendicular to the belt width are not considered to be a fault. If longitudinal cracks appear on the belt, or the belt edges are ragged, or some material parts are pulled off, then the belt must be replaced.

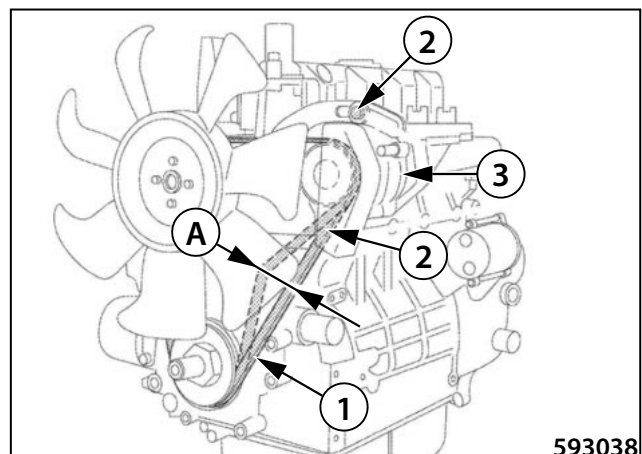


Belt tension check

Push your thumb with 110 N (25 lb) force where the belt length between pulleys is the longest. The max. slack (A) is 7–9 mm (0.28–0.35 in).

Tighten the belt (1) by loosening the screws (2) and shifting the alternator (3) if required.

Check the belt for correct tension.



3.6.13 Brake test

3.6.13.1 Check of the parking brake

This test verifies the function of the parking brake. The ability of the parking brake to hold the machine can be checked using the "Brake Test" mode. After starting this mode, the traction force of the machine acts on the stationary machine with the parking brake (P) engaged for a given time.



Perform the test on a level and solid surface.

Check that the area in front of and behind the machine is empty and that there are no persons or obstacles there! Ensure a suitable safe distance in front of the machine, behind the machine as well as on its sides.

Procedure

Place the machine on a flat and solid surface.

Sit in the driver's position and start the engine according to Chapter 2.7.1.

The travel control (11) must be in the parking brake position "P".

Switch to the "Brake test" mode by pressing the brake test button (A) for 5 seconds. While the button is held down, the display shows the "btn br" status.

After 5 seconds, the display shows the "br tSt" status.

Start the test by setting the travel control to the forward travel position.

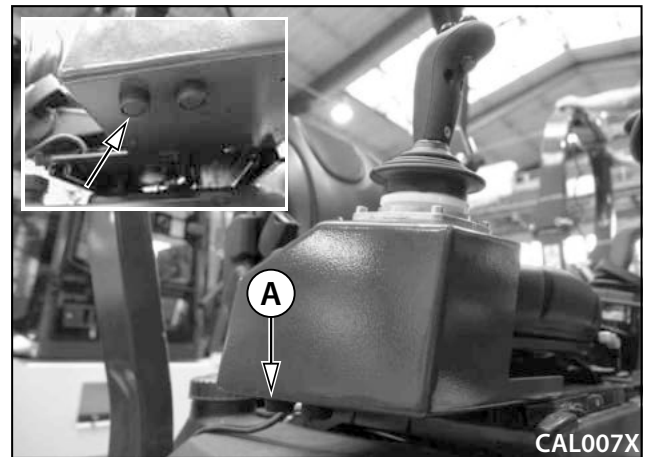
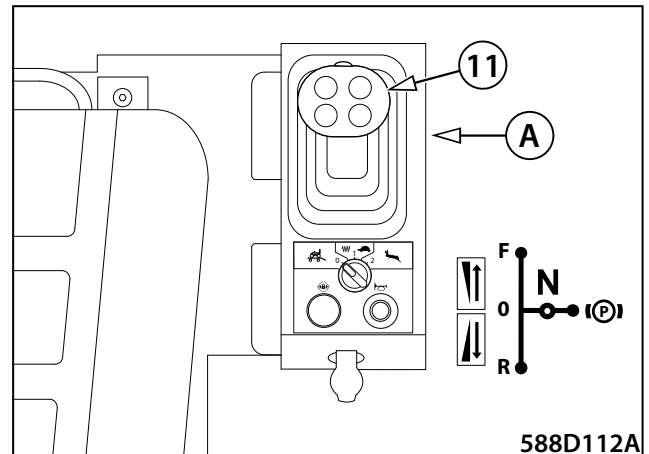
- The machine must not move off. If the machine moves off, the test is unsuccessful – the machine stops by itself after 3 seconds or it can be stopped by moving the travel control (11) to any position except for the forward position.

The test can be interrupted prematurely by moving the lever anywhere out of the forward position. This stops the traction force. The machine is still in the "Brake test" mode.

For normal operation or to repeat the brake test, stop the "Brake test" mode by moving the travel control (11) back to the parking brake position "P".

To repeat the test, follow the steps above to start the "Brake test" mode.

After an unsuccessful brake test, secure the machine against spontaneous movement by wedges and contact service.



3.6 Lubrication and maintenance operations

3.6.13.2 Check of the emergency brake

This test verifies the function of the emergency brake. Due to possible wear of the parking brake, the emergency brake check is to be performed with a stationary machine. During normal operation, the emergency brake button is to be used in the event of danger when the machine is running. After pressing the emergency brake button, the traction force immediately stops and the parking brake (P) engages.



Check that the area in front of and behind the machine is empty and that there are no persons or obstacles there! Ensure a suitable safe distance in front of the machine, behind the machine as well as on its sides.

Procedure

Place the machine on a flat and solid surface.

Sit in the driver's position and start the engine according to Chapter 2.7.1.

Set the travel control (11) to the neutral position "N".

The parking brake indicator lamp (29) goes off.

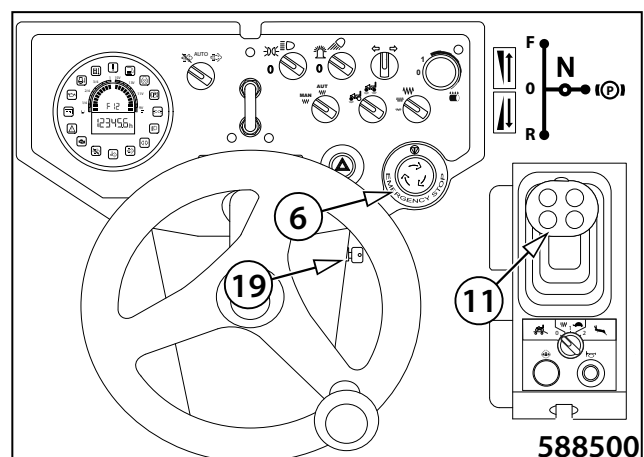
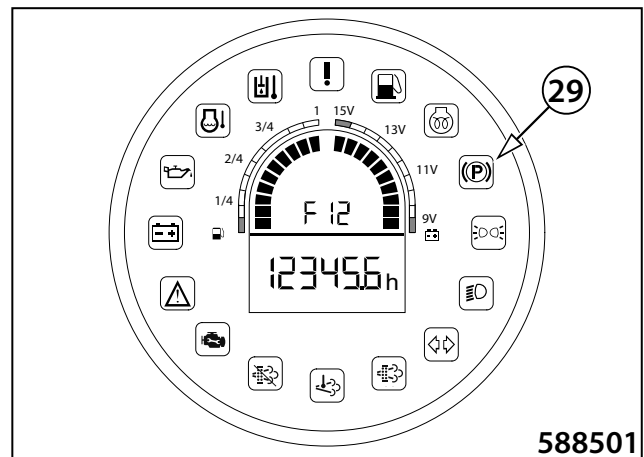
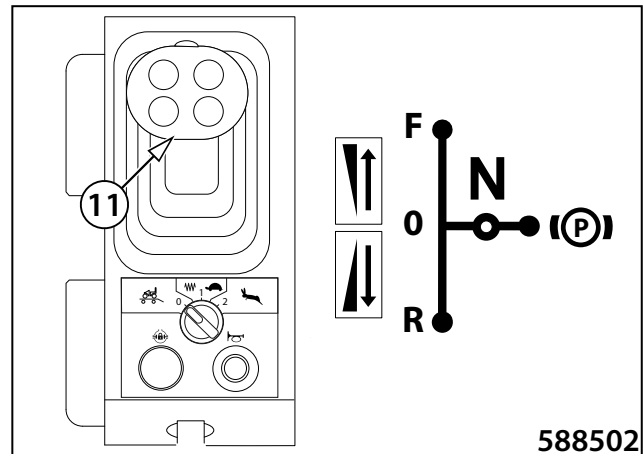
The machine is unbraked.

Press the emergency brake button (6). The engine stops and the parking brake indicator lamp (29) lights up.

If the engine does not shut down, turn it off using the key in the ignition box, secure the machine against spontaneous movement using wedges on a level and solid surface and contact service.

Note:

The emergency stop button (6) is only to be used to stop the machine in an emergency. Use the service brake to stop the machine normally. To turn off the engine normally, use the ignition box (19) – turn the key to the "0" position.



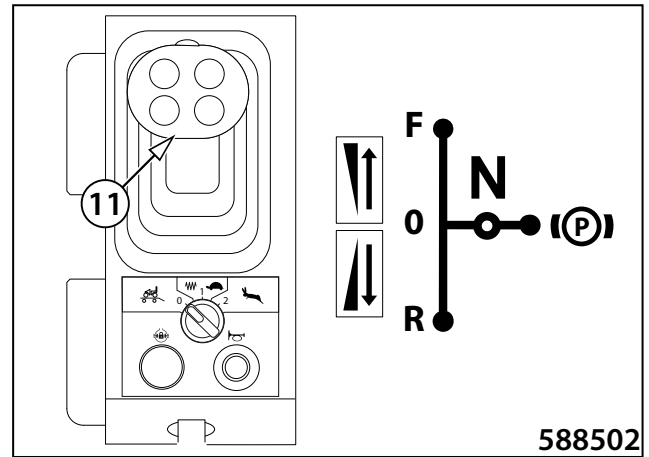
3.6.13.3 Check of the service brake

This test verifies the function of the service brake. After activating the service brake, the hydraulic components of the machine drive adjust to stop the machine. The service brake can be controlled at any time. Using the service brake does not activate the parking brake (P).



Check that the area in front of and behind the machine is empty and that there are no persons or obstacles there! Ensure a suitable safe distance in front of the machine, behind the machine as well as on its sides.

Perform the test on a level and solid surface. If the test is performed on a slope, the machine may start moving due to leaking hydraulics even though the service brake is in order!



Procedure

Place the machine on a flat and solid surface.

Sit in the driver's position and start the engine according to Chapter 2.7.1.

Move off by setting the travel control (11) to the forward travel position "F".

Set the travel control to the neutral position "N".

The machine will stop and the parking brake will not activate.

To move off again or control the brake during braking, move the travel control (11) back to the forward travel position "F".

If the machine does not stop, activate the emergency brake, secure the machine against spontaneous movement using wedges on a level and solid surface and contact service.



Activation of the emergency brake will cause a high mechanical and hydraulic load of the machine. Always test the parking brake after activating the emergency brake while driving.

3.6 Lubrication and maintenance operations

3.6.14 Check of the tightness of the fuel and hydraulic system

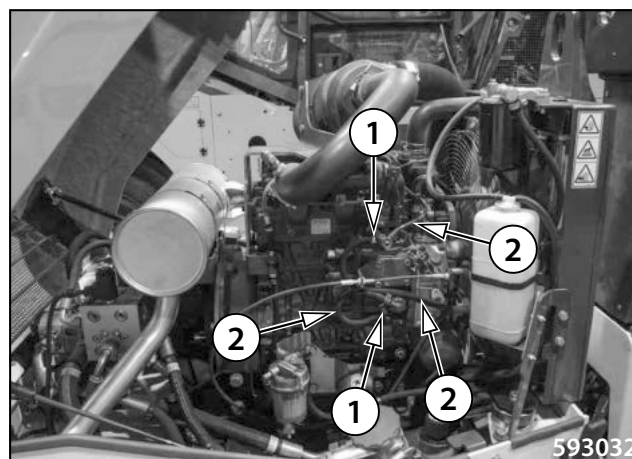
Visually check the condition of the fuel and hydraulic system for leaking operating fluids or damage to individual system components (material degradation – ageing).

Remove the identified defects.

Every 50 hours of operation

3.6.15 Check of hoses and clips

Check visually clips (1) and fuel hoses (2). If clips are loosened or hoses worn out, ensure remedy.



3.6 Lubrication and maintenance operations

3.6.16 Battery inspection

Stop the engine.

Clean the surface of batteries.

Check the condition of the terminals and clamps. Clean the terminals and clamps. Apply a thin layer of grease on the terminals.

MAINTENANCE-FREE BATTERY

In case of a maintenance-free battery version (the battery has no accessible plugs), check only the rest voltage on the terminals. The batteries cannot be refilled. If the rest voltage is 12.6 V and more, the battery is fully charged. If the rest voltage is below 12.4 V, the battery should be charged immediately. After the battery is charged, leave it to stand for 2–3 hours and then measure the voltage again. The mounting is recommended 24 hours after the charging.

Note

The rest voltage is the voltage measured at the terminals of the battery, which was at rest for at least 12 hours – it was not either charged or discharged.



Do not turn the battery upside down; the electrolyte may pour down from the degassing plugs.

If the electrolyte is spilled, wash the affected area with water and neutralize with lime.

Hand over the old inoperative battery for disposal.



Keep the battery dry and clean.

Do not disconnect the battery when the engine is running.

When working with the battery always follow instructions of the battery manufacturer!

Disconnect the battery for repair or while handling wires and electrical components in the wiring circuit to prevent short-circuit.

When disconnecting the battery, first disconnect the cable of the (–) pole. When connecting the battery, first connect the (+) pole.

Use rubber gloves and eye protection devices when handling the battery.

Use suitable clothing to protect your skin against contact with the electrolyte.

After eye contact with the battery electrolyte, immediately flush the affected eye thoroughly with running water for several minutes. Then seek medical advice.

After ingestion of the electrolyte drink large quantities of milk, water or suspension of magnesium hydroxide in water.

In case of skin contact with electrolyte, remove your clothing and shoes, wash the affected skin immediately with soap and water or with solution of water and soda. Then seek medical advice.

Do not eat, drink and smoke while working!

After completing the work, wash your hands and face thoroughly with water and soap!

Do not check that a wire is live by touching the machine frame.

Never make direct conductive connection between both poles of the battery to avoid a short circuit and a risk of explosion of the battery.

Every 100 hours of operation (weekly)

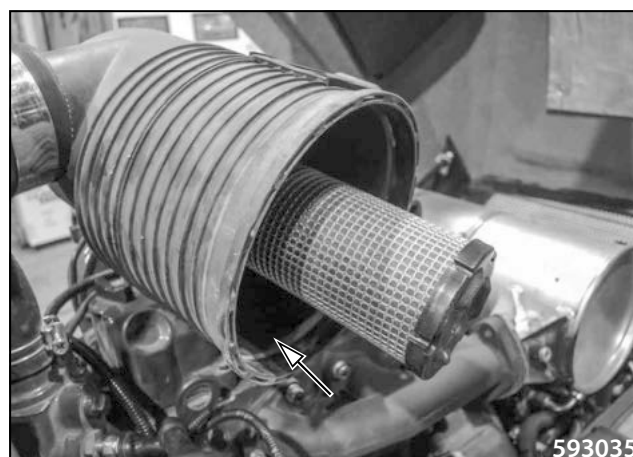
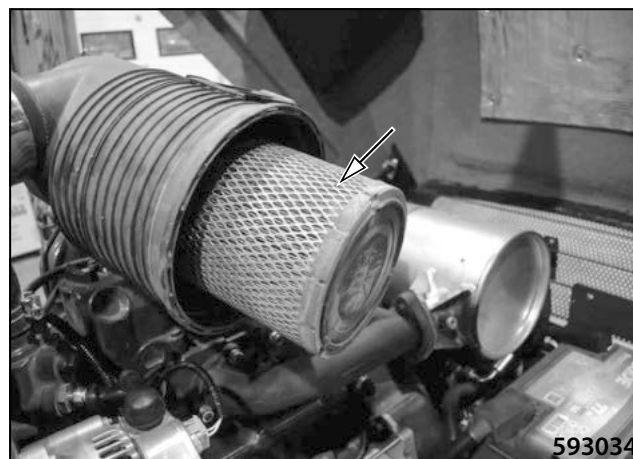
3.6.17 Air filter cleaning

Remove the main cartridge of the air filter and clean with compressed air.

Clean the internal area of the filter and of the contact surface to avoid contamination of the safety cartridge.



Never use compressed air to clean the filter interior.



3.6 Lubrication and maintenance operations

3.6.18 Cleaning the water separator on the fuel filter

If the red ring goes up from the bottom, drain the water from the separator.

Close the stop valve (1).

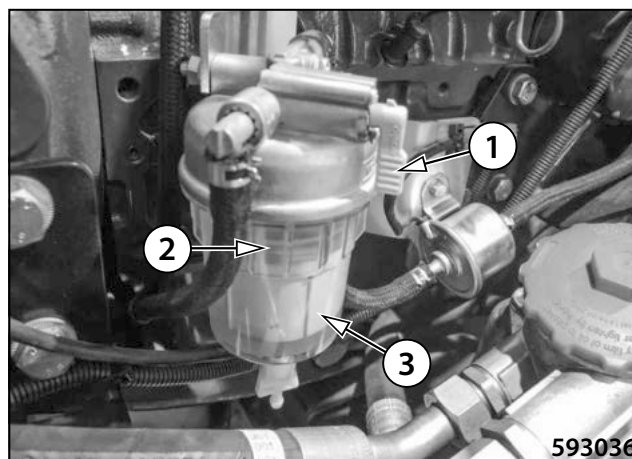
Unscrew the filter housing (2).

Clean the filter element (3).

Screw in the filter housing back (2)

Open the stop valve (1).

Turn the ignition on. The fuel pump will vent the system automatically.



Fuel filter cartridge

Order number: 1503944



Do not smoke while working!



Check the water separator for leaks.



Stop the fluid soaking into the ground.

3.6.19 Machine lubrication

Remove the caps on the grease nipples.

Before lubricating, clean the grease nipple.

Connect the grease gun to the grease nipple.

Lubricate the bearing sufficiently until the lubricant starts to flow out.

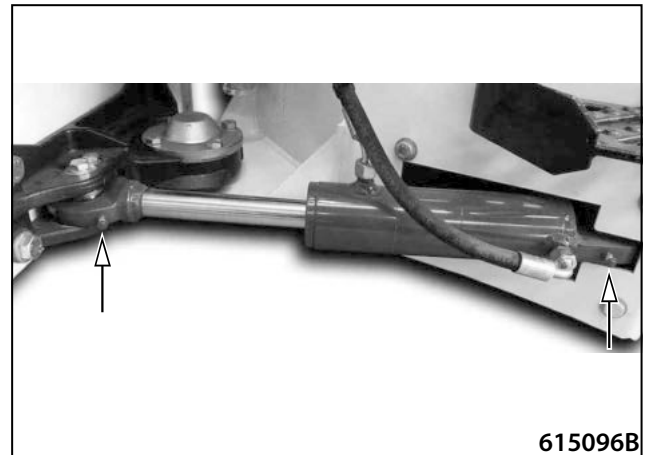
Install the protective cover in place.

Note

After every machine cleaning or steam cleaning, lubricate the bearing again.

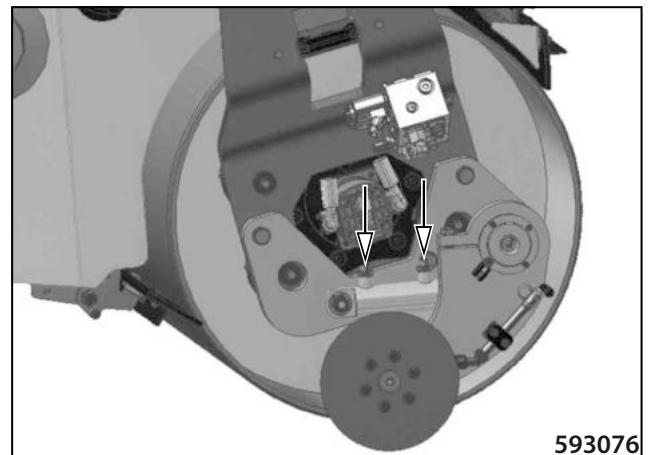
Steering linear hydraulic motor

Turn the steering mechanism up to the stop to lubricate the hydraulic cylinder. Turn the machine slightly to the right and to the left. This will loosen the bearings.



Edge cutter

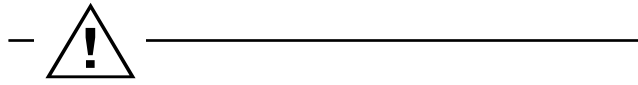
Pins 2x



3.6 Lubrication and maintenance operations

3.6.20 Tyre pressure check

Check the air pressure with a pressure gauge on the tyre valve;
100 kPa (14.5 PSI).



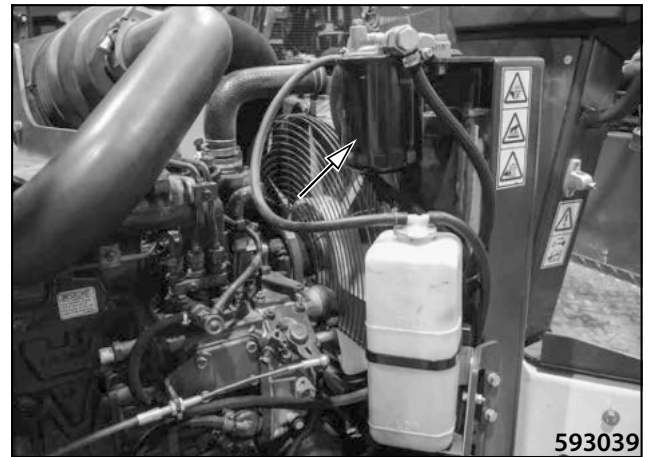
Pay attention to the equal pressure in all of the tyres.

Every 250 hours of operation (every 3 months)

3.6.21 Fuel filter replacement

Clean the fuel filter head.

Remove the filter.



Lubricate the seal rings of the new filters with oil.

Fill up the filter with new fuel. Mount the new filter in the machine. Tighten manually!

Vent the fuel system.

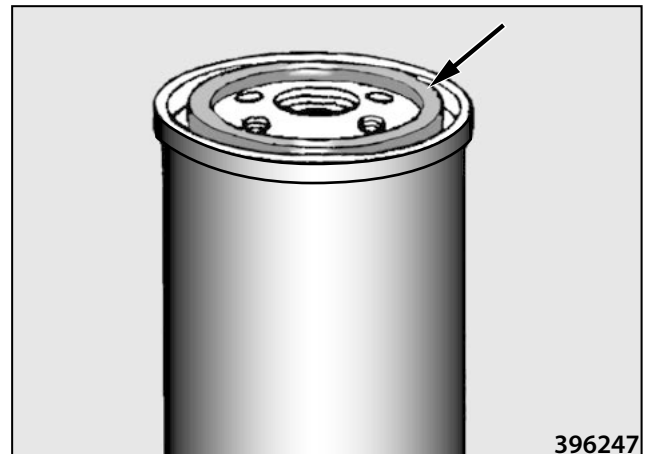
Fuel filter

Order number: 1503943



Follow safety regulations!

Do not smoke and do not use an open flame while working on the fuel system!



Use original specified filters.

Do NOT tighten the filters with force!



Catch the drained fuel.

Store used filters in a separate container and hand them over for disposal.

3.6 Lubrication and maintenance operations

3.6.22 Engine oil change



Carry out for the first time after 50 hours

Drain the oil after the operation is finished immediately after the coolant has been cold down to 60 °C (140 °F), or warm up the engine during operation until the coolant temperature reaches 60 °C (140 °F).

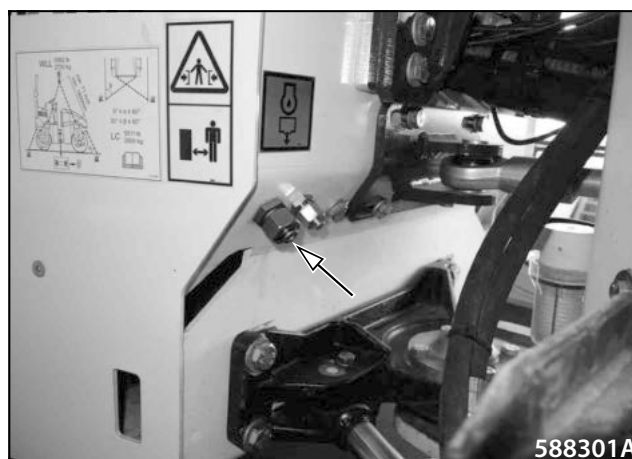
The engine oil drain plug is on the left side in front between the front and rear frame of the machine.

Turn the machine to the right to get better access to the drain plug.

The total volume of oil in the engine is 7 litres (1.85 US gal).

Remove the drain plug and let the oil drain out.

Remount the plug.



Clean the surface around the head of the oil filter. Remove the filter. Clean the seating surface for the filter gasket.

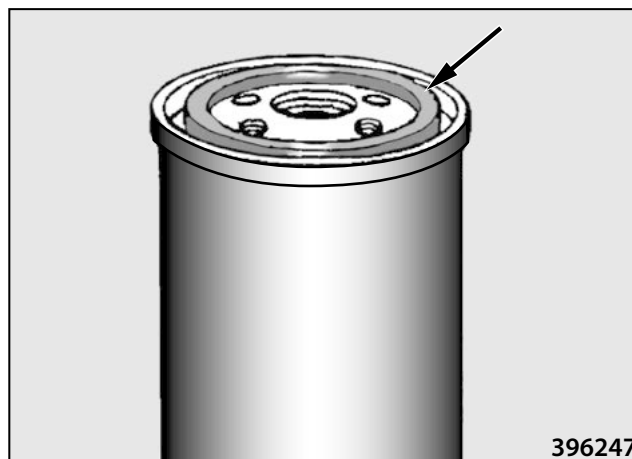


Lubricate the gasket with oil.

Mount the new filter.



Do not overtighten the filters to prevent damage to the thread and gasket.



Engine oil filter

Order number: 1504183

Fill the engine through the filler neck.

Keep the level within the range of gauge marks imprinted in the dipstick (1). The lower mark shows the lowest possible oil level, the upper mark indicates the highest.

Refill the oil to the upper oil level mark (1). The oil volume is 7 l (1.85 gal US) including the oil filter volume.

Note

After refilling, start the engine for 2–3 min. Check tightness of drain plug and filter.

Stop the engine and wait for 5 minutes until the oil runs down into the engine sump. Then check the level with the oil dipstick.



Beware of the risk of scalding when draining hot oil.
Let the oil cool down below 50 °C (122 °F).
Follow the fire-fighting measures.



When changing oil, check that the old oil has been drained from the tank completely. Do not mix different types of oils.

Change the oil after 6 months at the latest even if 500 hours have not been worked. Exchange oil in the interval that comes first.

Use recommended filters only; refer to the spare parts catalogue. Use recommended oils; see Chap. 3.2.1.



Catch the drained oil and do not let it soak into the ground.

Used oil and filters are environmentally hazardous waste – hand it over for disposal.



3.6 Lubrication and maintenance operations

3.6.23 Checking the hoses of the engine cooler for wear and mounting

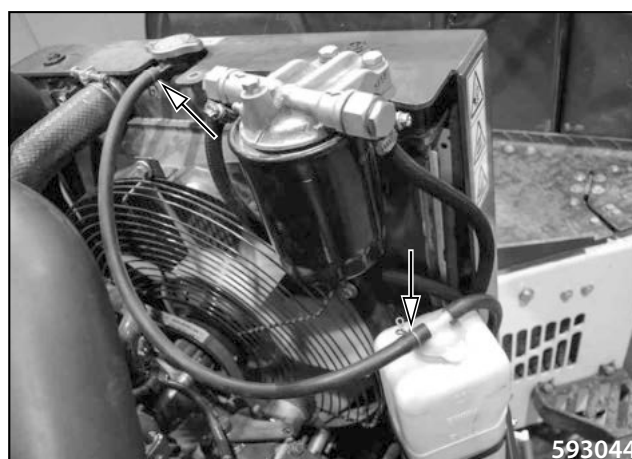
Check the cooling system for defective hoses and missing hose clips. Check the cooler for damage and leaks and the cooling fins for clogging. Clean and repair the cooler if required.

3.6.24 Checking the hoses and clips for mounting

Check the engine intake piping for leakage. Check the hose for damage and missing hose clips.



Check the cooling circuit for leakage. Check the hoses for damage and missing hose clips. When hoses are cracked or hardened, replace them for new ones.



3.6.25 Sprinkling filter cleaning

Remove the sprinkling filter vessel, remove the sieve, clean it and mount back.

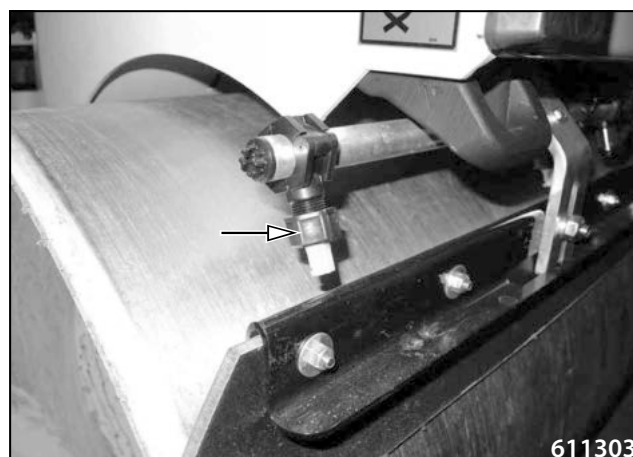
Check the seal.

Replace if damaged.

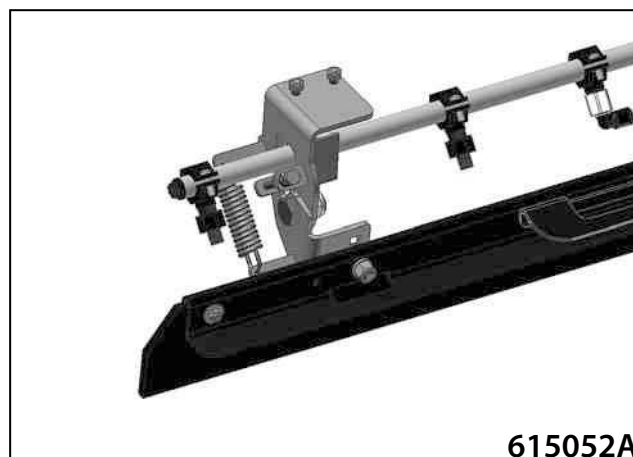


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Remove and clean the sprinkler strainers.



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3.6 Lubrication and maintenance operations

3.6.26 Engine intake pipe inspection

Check the engine intake piping for leakage.

Check the rubber air suction hose from the filter for damage and for missing clamping clips.

Check the connection between the bonnet and air filter for leakage.

Replace damaged gasket with new one.



Do not work with the machine if the seal between the bonnet and the air filter is damaged or the connection is leaky.



**Every 500 hours of operation (every 6 months)
but at least once a year**

3.6.27 Fuel tank cleaning

Over time, condensed water accumulates in the fuel tank and it should be drained.

Remove the plug from the fuel tank.

Place a vessel under the drain plug.

Drain the engine diesel fuel.

Check and clean the interior of the tank.

Put on the screw plug.

Tighten the screw connection with hand.

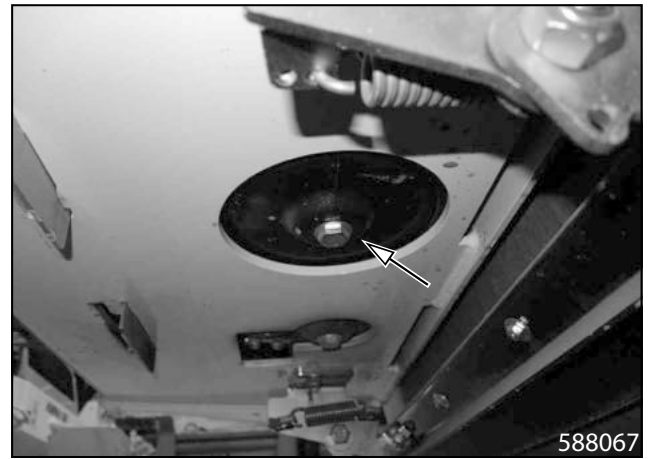
Fill the fuel tank with diesel fuel up to the lower edge of the filler neck.



Do not smoke while working!



Catch the drained fuel.



3.6 Lubrication and maintenance operations

3.6.28 Electrical installation inspection

Check cables, connectors, protective hoses and their attachments for damage, in particular if they are near hot surfaces and moving parts of the machine including the engine. Replace damaged parts. Use only original spare parts.

3.6.29 Replacement of the fuel separator filter cartridge

If the red ring goes up from the bottom, drain the water from the separator.

Close the stop valve (1).

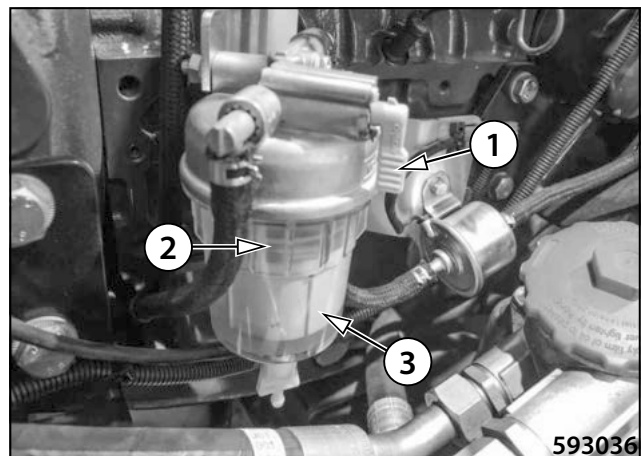
Unscrew the filter housing (2).

Replace the filter element (3).

Refit the filter housing (2).

Open the stop valve (1).

Turn the ignition on. The fuel pump will vent the system automatically.



Fuel filter cartridge

Order number: 1503944



Do not smoke while working!



Check the water separator for leaks.



Stop the fluid soaking into the ground.

3.6.30 Valve clearance check and adjustment

Contact the Kubota service for adjusting the engine valves.

3.6.31 Engine cooler cleaning

The cooler fouling results in reduced cooling effect and increased temperatures of the engine coolant.

Clean with compressed air or pressure water (steam). Clean in the direction from the fan side.



When working in a very dusty environment, carry out the cleaning daily.

Do not use cleaners with a too high pressure to avoid damage to the cooling fins.

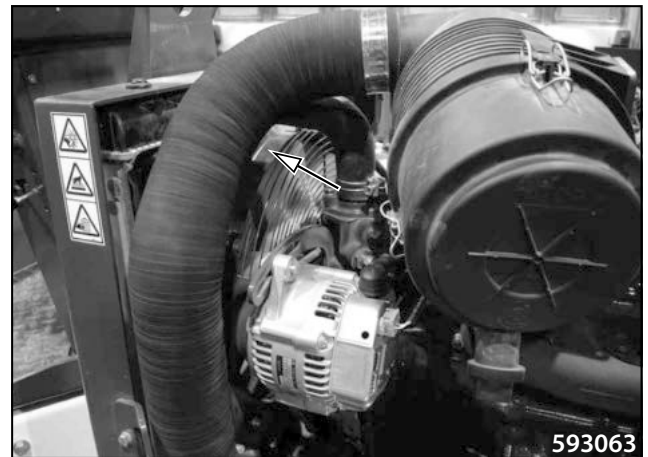
When the cooler is contaminated by petroleum products, use a cleaning agent and proceed according to the manufacturer's instructions! Find out the cause of contamination!



Follow environmental standards and regulations when cleaning the machine!

Clean the machine in a workplace equipped with a catching system of cleaning agents to avoid contamination of the soil and water resources!

Do not use forbidden cleaning agents!



3.6 Lubrication and maintenance operations

3.6.32 Check of rubber-metal elements of the engine cooler

Recheck the rubber-metal elements for condition and for rubber-to-metal bond strength.

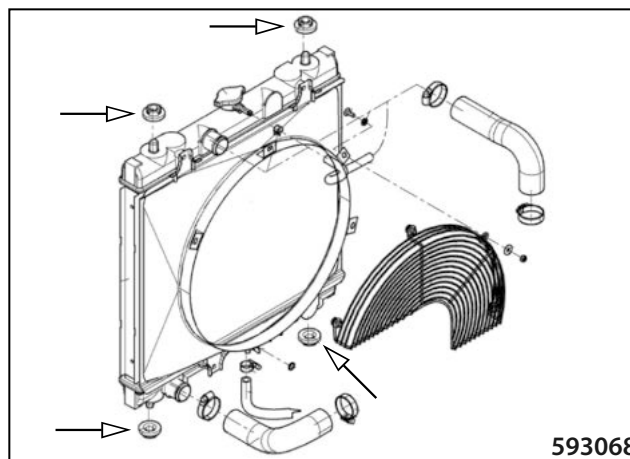


Replace if damaged.

Recheck screws and nuts for tightening.

Engine cooler rubber-metal element

Order number: 1448304



Every 1000 hours of operation (yearly)

3.6.33 Hydraulic oil change and filter replacement



Check for the first time after 500 hours.

Hydraulic oil filter replacement

Take off the filter cap.

Unlock the filter cartridge.

Pull out the filter cartridge from the filter housing.

Dispose of the filter cartridge environmentally.

Insert the new filter cartridge in the correct place. Keep the position of the safety cam.

Turn the filter cartridge clockwise up to the stop.

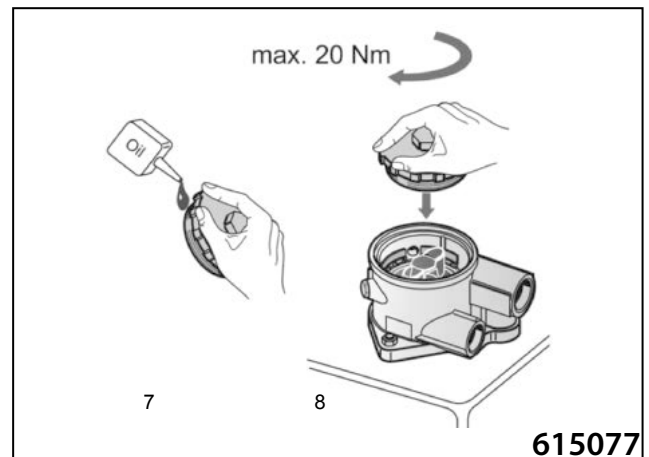
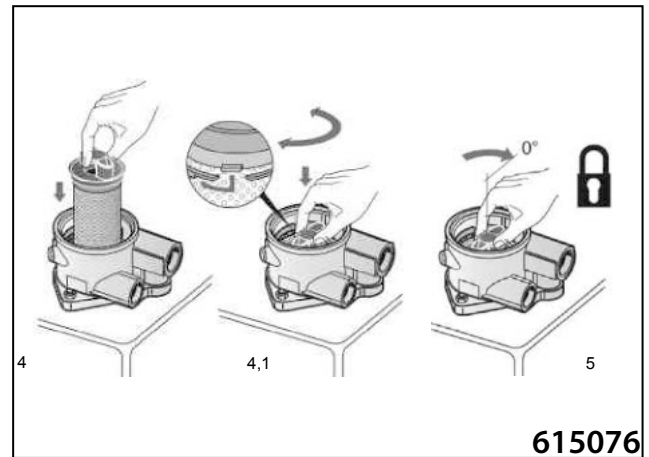
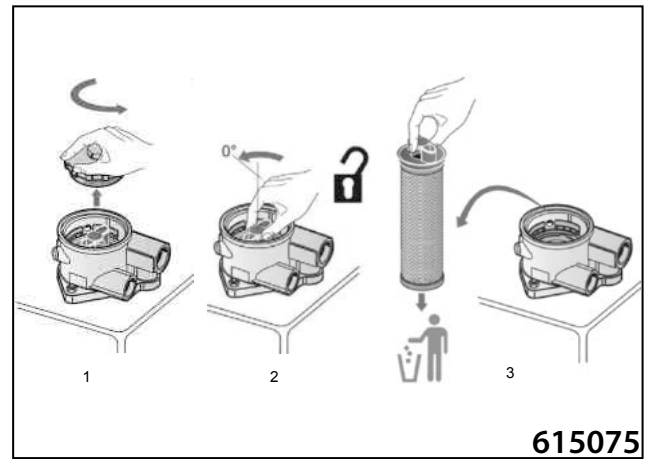
Oil the sealing ring on the filter cap slightly.

Put the filter cap in place.

Tighten the cap with the torque spanner (max. torque 20 Nm).

Set of hydraulic oil filters

Order number: 1182946



Hydraulic oil draining

Note

Drain hydraulic oil only at operating temperature. Residues in the tank are drained with the oil.

Place a vessel under the hydraulic oil drain plug. Oil charge is 28.5 l (7.5 gal US).

Take out the ventilation filter.

Remove the cap from the hydraulic tank.

Let the oil flow out into the vessel.

Mount the plug. Tighten the screw connection with hand.

Tighten the screw connections in the hydraulic tank with hand.



3.6 Lubrication and maintenance operations

Hydraulic circuit filling

Take out the ventilation filter.

Fill the hydraulic oil through the hole into the tank.

Replace the ventilation filter with a new one.

Lubricate the seal ring of the new filter cap with oil.

Mount a new filter (1).



Carry out the oil change when the oil is warm, preferably after operation of the machine.

Let the drained oil cool down below 50 °C (122 °F).

Refill the same type of oil.

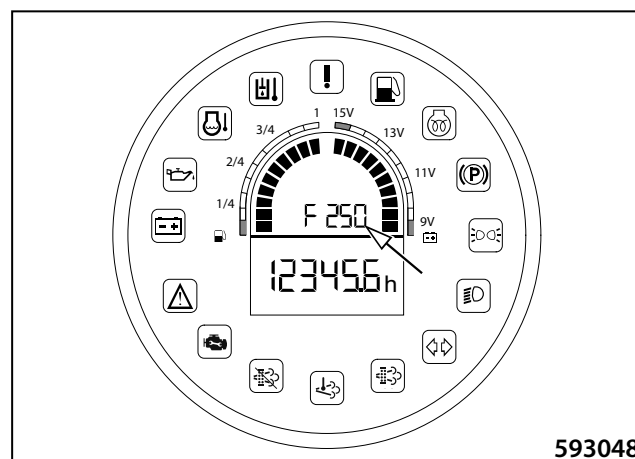


Stop the oil soaking into the ground.



3.6.34 Replacement of air filter cartridges

If the F250 error code appears on the display during operation of the machine, the cartridge must be replaced, however after 500 operation hours at the latest.

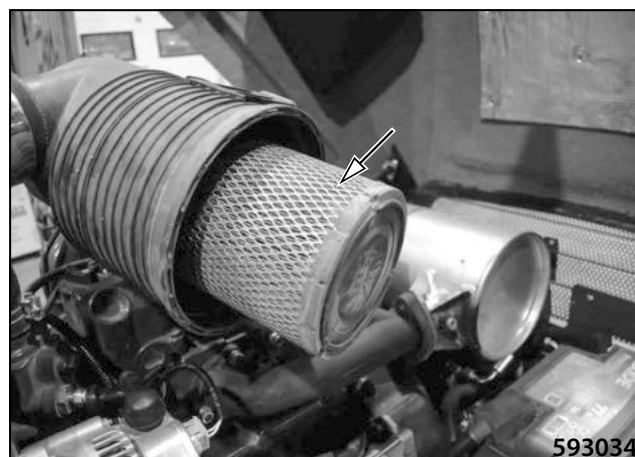


Remove the filter cap.



Take out the main cartridge.

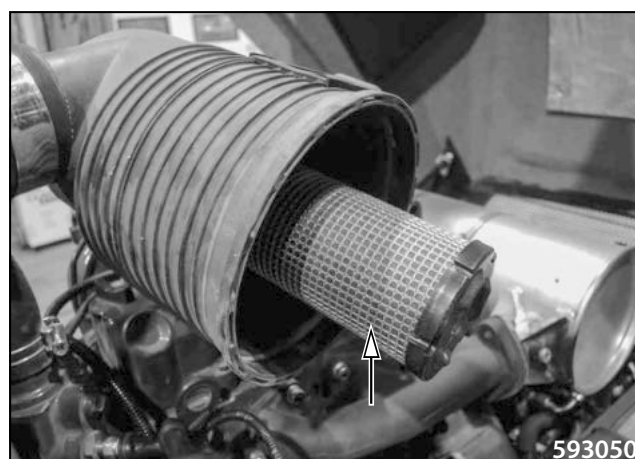
Air filter cartridge, external
Order number: 1232013



Take out the safety element.

Replace the safety cartridge after every third replacement of the main cartridge.

Air filter cartridge, internal
Order number: 4-5358520090

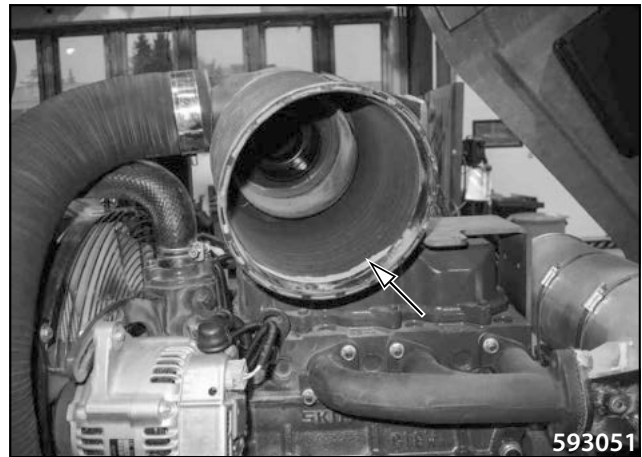


3.6 Lubrication and maintenance operations

Clean the internal area of the filter and of the contact surface so that no dust is taken into the inner supply piping towards the engine.

Insert the new safety cartridge.

Insert the new main cartridge. Check that both cartridges are mounted correctly and are sealing.



Remove the dust valve of the air filter, clean and remount.



Check connections and the piping for leakage and the engine inlet opening on the bonnet for clogging (e.g. by leaves).



Do NOT clean filter's inner space with pressure air so no dust is taken into the engine intake piping.

Use original cartridges, only.

Take care not to splash water into the air filter.

Replace the dust valve immediately if it is damaged!

NEVER operate the machine with filter body or lid damaged.

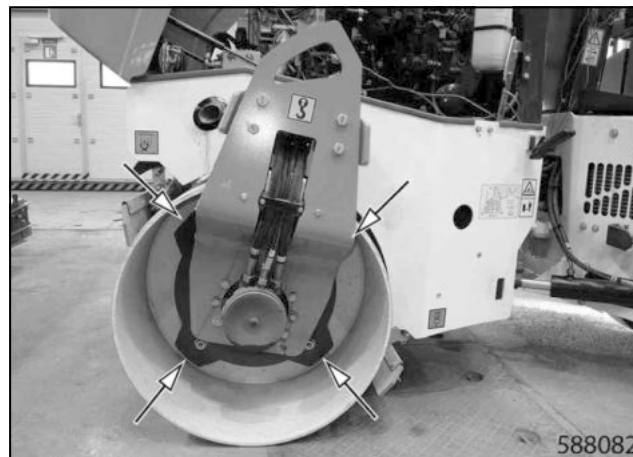


3.6.35 Damping system check

Recheck the rubber-metal elements for condition and for rubber-to-metal bond strength.

Drum rubber-metal element

Order number: 1175152



Engine rubber-metal element

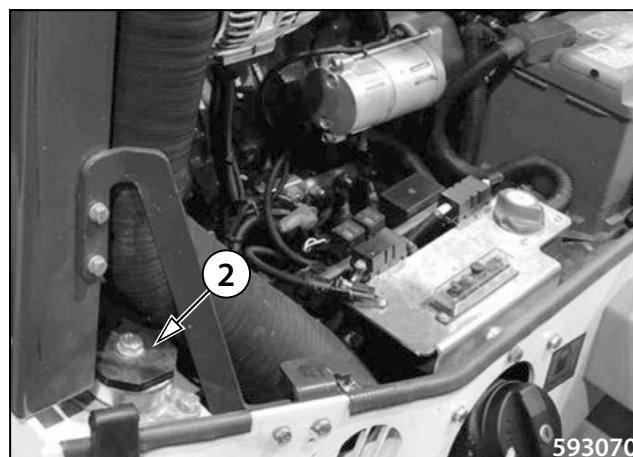
Order number (1): 1-491740

Order number (2): 1-491741



Replace if damaged.

Recheck screws and nuts for tightening.



3.6 Lubrication and maintenance operations

3.6.36 Swinging support check

Once a year check the swinging support for excessive clearance.

Machine equipped with a one-point lifting lug

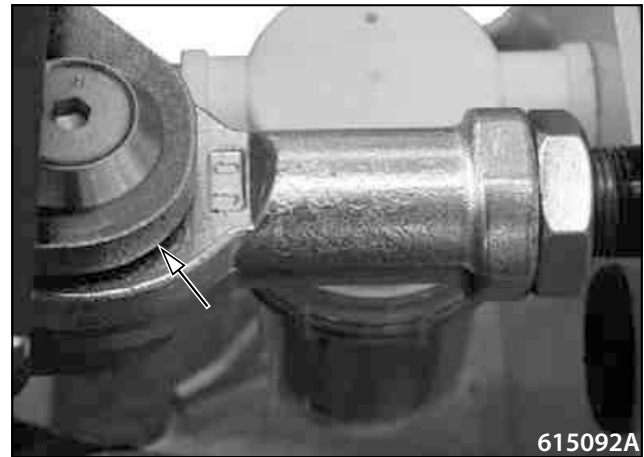
Lift the machine with a crane while using the one-point lifting lug.

Visually check the clearance of the swinging support by applying pressure on the machine alternatively upwards and downwards.

The machine is not equipped with a one-point lifting lug

Lift the machine slightly with a suitable hydraulic jack.

Visually check the clearance of the swinging support by applying pressure on the machine alternatively upwards and downwards.



3.6.37 Articulation joint check

Once a year check the articulation joint for excessive clearance.

Machine equipped with a one-point lifting lug

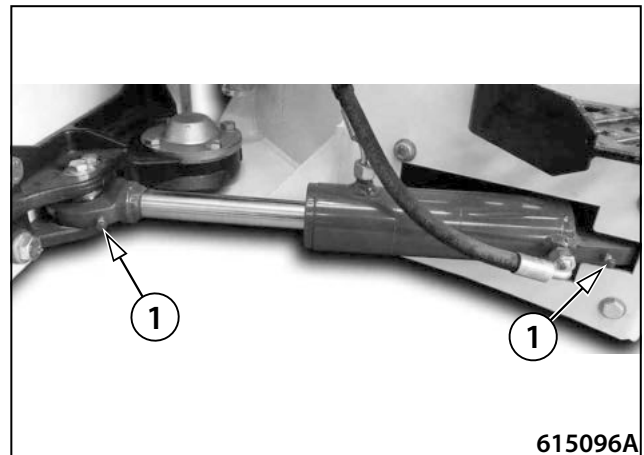
Lift the machine with a crane while using the one-point lifting lug.

Visually check the clearance of the articulated joint by applying pressure on the machine alternatively upwards and downwards.

The machine is not equipped with a one-point lifting lug

Lift the machine slightly with a suitable hydraulic jack.

Visually check the clearance of the articulated joint by applying pressure on the machine alternatively upwards and downwards.



Every 2000 hours of operation (every 2 years)

3.6.38 Engine belt replacement

Loosen the alternator screws.

Take out the engine belt.

Insert the new belt.

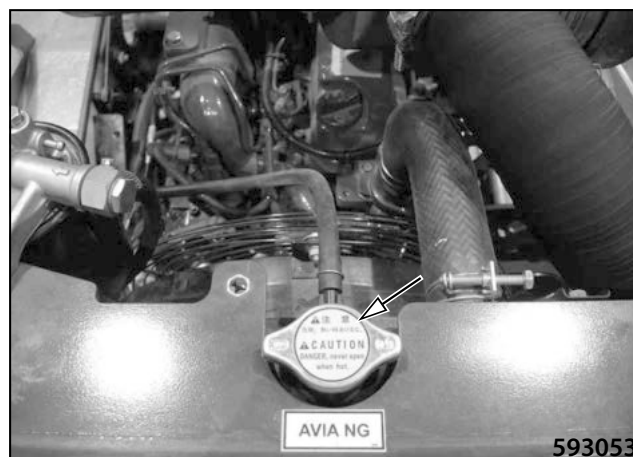


Change and tension the belt when the engine is not running!



3.6.39 Engine coolant change

Open the cooling system by removing the overpressure plug on the expansion tank.



Remove the drain plug and drain the coolant.

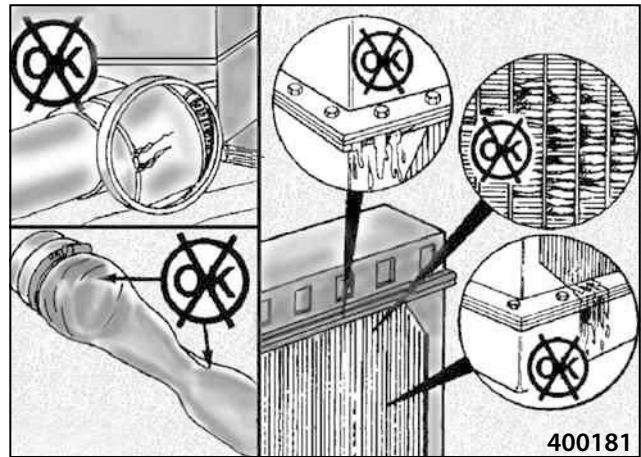
Note

The total volume of coolant in the engine is 6.7 l (1.8 US gal).



3.6 Lubrication and maintenance operations

Check the cooling system for defective hoses and missing hose clips. Check the cooler for damage and leaks and the cooling fins for clogging. Clean and repair the cooler if required.



Fill the cooling system through the hole in the expansion tank.



Remove the filling plug only after the temperature of the engine coolant has dropped below 50 °C (120 °F). If you remove the plug at a higher temperature, there is a risk of steam or coolant scalding due to an internal overpressure.



The level must not drop below the lower mark.

Refill only with a coolant containing antifreeze agents on the same basis according to Chapter 3.2.3.

Do not use any additives to repair the cooling system leakage into the engine coolant!

Do not refill cold coolant into a hot engine. There is a danger of damage to the engine castings.

In case of larger losses, find out where the cooling system leaks and repair the cause.

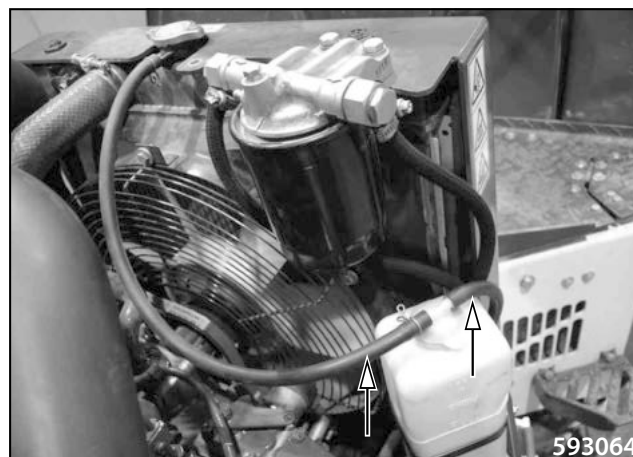


Stop the oil soaking into the ground.



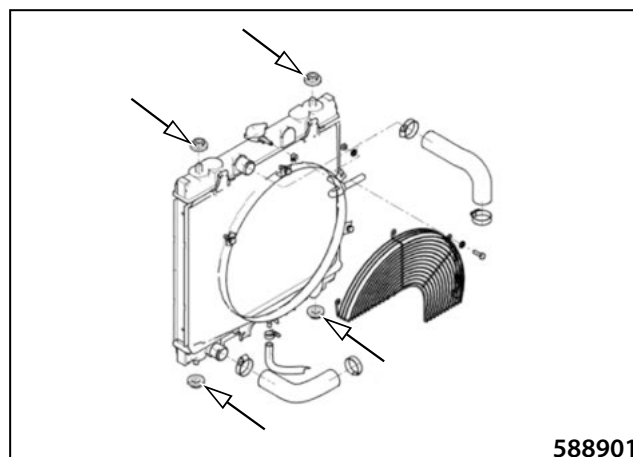
3.6.40 Replacement of hoses of the cooling system

Replace hoses of the cooling system.



3.6.41 Replacement of rubber-metal elements of the engine cooler

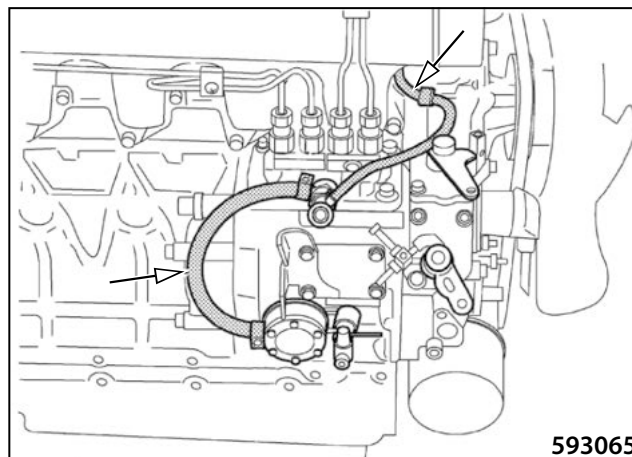
Replace rubber-metal elements of the engine cooler.



3.6 Lubrication and maintenance operations

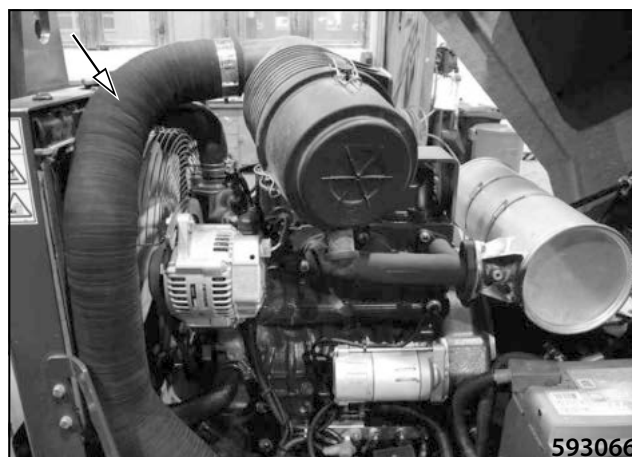
3.6.42 Replacement of hoses of the fuel system

Replace hoses of the fuel system.



3.6.43 Replacement of suction hoses

Replace suction hoses.



Maintenance as required

3.6.44 Gas strut replacement

The gas struts are maintenance-free. They do not require any maintenance, such as e.g. lubrication. They are designed according to given requirements and work trouble-free for years. As soon as the struts stop performing their function, replace them with new ones.

Gas strut

Order number: 1448823



Before beginning to replace the gas strut, secure the engine bonnet against free fall.

There is a risk of injury!

Removal

Use a screwdriver to pull out the clamps and release the struts.

Pull out the gas strut away from the ball stud.

Installation

Push the new gas strut on the ball stud.

The clamp then needs to be safely seated.



Do not install the gas strut if it is damaged due to mechanical handling.

Use genuine parts only!



If you do not need the gas struts any more, dispose of them environmentally.



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3.6 Lubrication and maintenance operations

3.6.45 Cleaning the water separator

If the red ring goes up from the bottom, drain the water from the separator.

Close the stop valve (1).

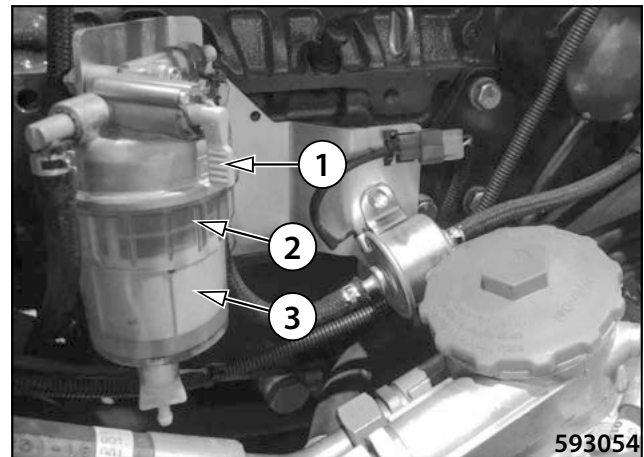
Unscrew the filter housing (2).

Clean the filter element (3).

Refit the filter housing (2).

Open the stop valve (1).

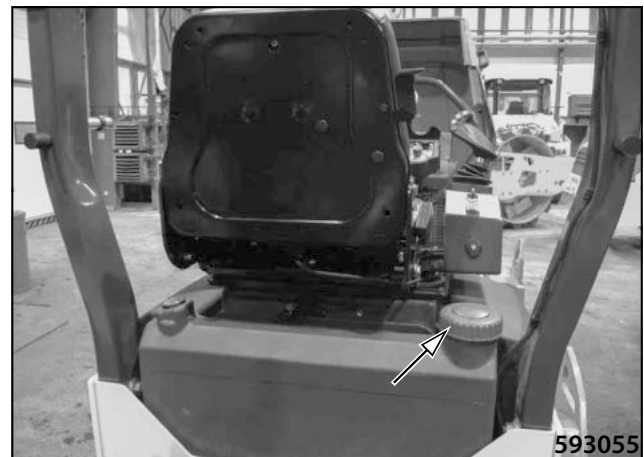
Turn the ignition on. The fuel pump will vent the system automatically.



3.6.46 Cleaning the water tank

Remove the cap of the filler neck of the tank.

Clean the strainer in the filler neck.



Remove the drain plug of the water tank.

Rinse the tank with running water.



3.6.47 Cleaning the machine

Clean the machine from big impurities after completing the work.

Clean the whole machine completely on regular basis, at least once a week.



Before cleaning with pressure water or steam, cover all holes, into which the cleaning agent could penetrate (e.g. intake opening of the engine). After completing the cleaning, remove the end caps.

Do not direct the running water or steam at the electric parts or insulation materials. Always cover such materials (interior of the alternator, etc.).

Clean with the engine stopped.

Do not use aggressive or easily ignitable cleaning agents (e.g. petrol and/or easily flammable substances).



Follow environmental standards and regulations when cleaning the machine!

Clean the machine in a workplace equipped with a catching system of cleaning agents to avoid contamination of the soil and water resources!

Do not use forbidden cleaning agents!

3.6 Lubrication and maintenance operations

3.6.48 Draining water from the sprinkling circuit before the winter season

Water must be drained from the sprinkling circuit before the winter season because the individual parts may get damaged due to frost.

Procedure for draining water from the sprinkling circuit

Release the quick coupler of the sprinkling hose.

Push the ring against the screw joint.

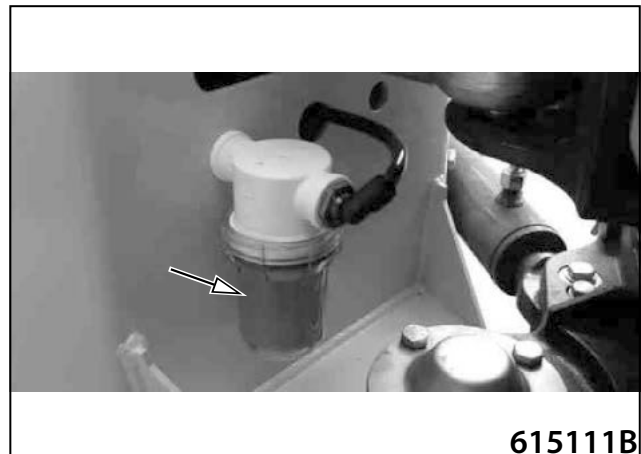
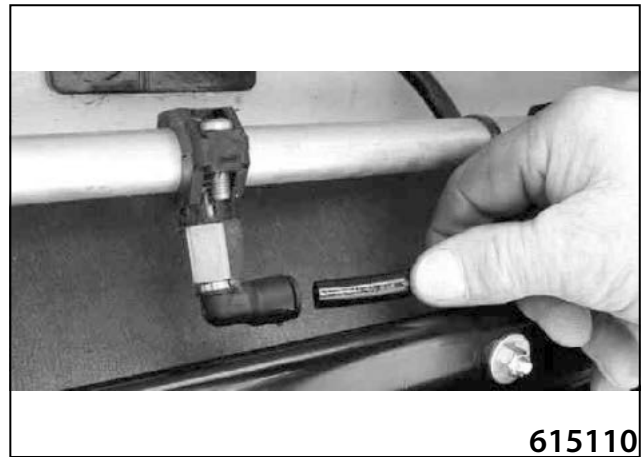
Remove the hose from the coupler.

The water will flow out automatically.

Turn on the sprinkling and let the pump run briefly. The remaining water will flow out.

Removal of the sprinkling filter

Remove and clean the vessel with the sprinkling filter. Keep the vessel with the filter in a safe place.



3.6.49 Fuel system venting

Vent the fuel system before the first start in the following cases:

- When fuel filters have not been filled with fuel – when replacing the filters
- when replacing the fuel pump
- when repairing the fuel system
- during long term shutdown of the machine
- when the tank is empty.



Low-pressure piping and filter venting:

Prepare a suitable vessel.

Connect the fuel filter bleeding hose and insert the other end into the catch pan.



Turn the key in the ignition box to position I.

The fuel pump starts working (it is audible).

Loosen the bleeding screw on the fuel filter.

Bleed the system – no air bubbles appear in the hose.

Tighten the screw.



Loosen the valve for about 10 seconds and retighten.

Start the engine.

Note:

If the engine does not start or stops immediately after starting, bleed the fuel system again.



Do not bleed when the engine is hot, the leaking fuel can cause a fire.

Follow safety regulations!

Do not smoke and do not use an open flame while working on the fuel system!



Stop the fuel soaking into the ground!

3.6 Lubrication and maintenance operations

3.6.50 Charging of the battery

- Only use chargers with an appropriate rated voltage. Check that the charger is strong enough to charge the battery not too strong to charge with excessive current.
- Read and observe the operating manual of the charger manufacturer.
- Check that the ventilation holes in the battery cover are not dirty or clogged and that gases can escape freely.
- Connect the positive terminal (+) of the battery to the positive terminal of the charger.
- Connect the negative terminal (-) of the battery to the negative terminal of the charger.
- Turn on the charger only after connecting the battery.
- Charge the battery with current corresponding to one tenth of the battery capacity.
- After charging, first turn off the charger and then disconnect the cables from the battery.
- The battery is fully charged, if:
 - electric current and voltage remain constant in the case of voltage-controlled chargers,
 - the charging voltage in the case of current-controlled chargers does not increase within two hours, the automatic charger turns off or switches to maintaining charge.



Use rubber gloves and eye protection devices when handling the battery.

Use suitable clothing to protect your skin against contact with the electrolyte.

After eye contact with the battery electrolyte, immediately flush the affected eye thoroughly with running water for several minutes. Then seek medical advice.

After ingestion of the electrolyte drink large quantities of milk, water or suspension of magnesium hydroxide in water.

In case of skin contact with electrolyte, remove your clothing and shoes, wash the affected skin immediately with soap and water or with solution of water and soda. Then seek medical advice.

Do not eat, drink and smoke while working!

After completing the work, wash your hands and face thoroughly with water and soap!

Do not check that a wire is live by touching the machine frame.



When working with the battery always follow instructions of the battery manufacturer!

Never charge a frozen battery or battery with a temperature above 45 °C.

Stop charging if the battery is hot or leaking acid.

Check that the ventilation holes in the battery cover are not dirty or clogged and that gases can escape freely. If the ventilation holes are clogged, gases can accumulate inside the battery and irreversibly damage it.

Never make direct conductive connection between both poles of the battery to avoid a short circuit and a risk of explosion of the battery.



Do not turn the battery upside down, the electrolyte can flow out.

If the electrolyte is spilled, wash the affected area with water and neutralize with lime.

Hand over the old inoperative battery for disposal.

3.6.51 Checking the screw connections for tightening

- Check regularly the screw connections for loosening.
- Use torque spanners for tightening.

	TIGHTENING TORQUE					TIGHTENING TORQUE			
	For screws 8.8 (8G)		For screws 10.9 (10K)			For screws 8.8 (8G)		For screws 10.9 (10K)	
Thread	Nm	lb ft	Nm	lb ft	Thread	Nm	lb ft	Nm	lb ft
M6	10	7.4	14	10.3	M18×1.5	220	162.2	312	230.1
M8	24	25.0	34	25.0	M20	390	287.6	550	405.6
M8×1	19	14.0	27	19.9	M20×1.5	312	230.1	440	324.5
M10	48	35.4	67	49.4	M22	530	390.9	745	549.4
M10×1.25	38	28.0	54	39.8	M22×1.5	425	313.4	590	435.1
M12	83	61.2	117	86.2	M24	675	497.8	950	700.6
M12×1.25	66	48.7	94	69.3	M24×2	540	398.2	760	560.5
M14	132	97.3	185	136.4	M27	995	733.8	1400	1032.5
M14×1.5	106	78.2	148	109.1	M27×2	795	586.3	1120	826.0
M16	200	147.5	285	210.2	M30	1,350	995.7	1,900	1401.3
M16×1.5	160	118.0	228	168.1	M30×2	1,080	796.5	1,520	1121.0
M18	275	202.8	390	287.6					

Values given in the table are tightening torques for dry threads (friction coefficient = 0.14). The values are not applicable to lubricated threads.

Table of tightening torques of cap nuts with sealing O-rings – hoses

			Tightening torque values of cap nuts with O-rings – hoses					
			Nm			lb ft		
Spanner size	Thread	Pipe	Nominal	Min	Max	Nominal	Min	Max
14	12×1.5	6	20	15	25	15	11	18
17	14×1.5	8	38	30	45	28	22	33
19	16×1.5	8	45	38	52	33	28	38
		10						
22	18×1.5	10	51	43	58	38	32	43
		12						
24	20×1.5	12	58	50	65	43	37	48
27	22×1.5	14	74	60	88	55	44	65
		15						
30	24×1.5	16	74	60	88	55	44	65
32	26×1.5	18	105	85	125	77	63	92
36	30×2	20	135	115	155	100	85	114
		22						
41	36×2	25	166	140	192	122	103	142
46		28						
50	42×2	30	240	210	270	177	155	199
50	45×2	35	290	255	325	214	188	240
	52×2	38	330	280	380	243	207	280
		42						

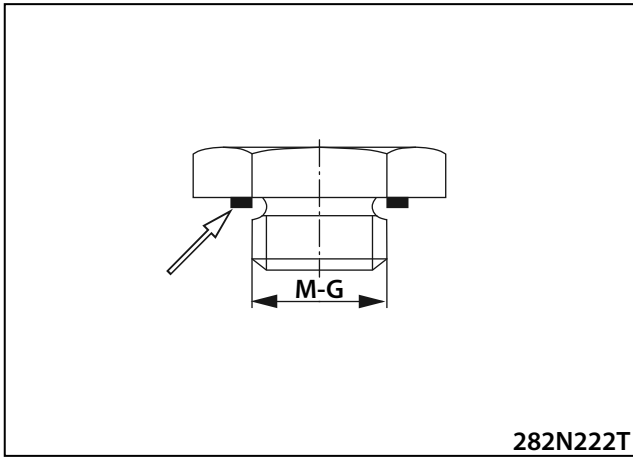
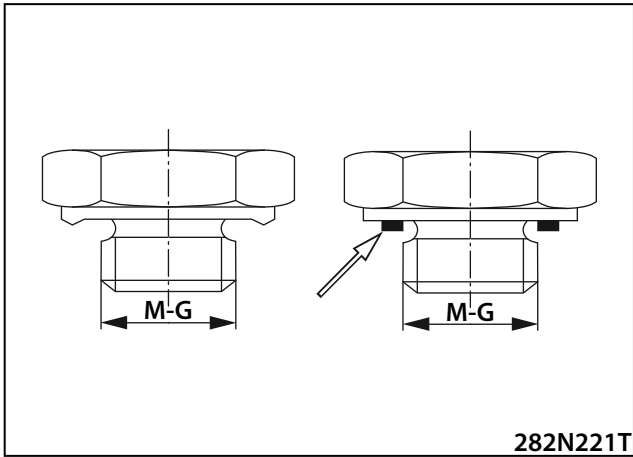
3.6 Lubrication and maintenance operations

Table of tightening torque values for necks with tightening edges or with flat gaskets

G-M	Neck tightening torques	
	Nm	lb ft
G 1/8	25	18
G 1/4	40	30
G 3/8	95	70
G 1/2	130	96
G 3/4	250	184
G 1	400	295
G 1 1/4	600	443
G 1 1/2	800	590
10×1	25	18
12×1.5	30	22
14×1.5	50	37
16×1.5	60	44
18×1.5	60	44
20×1.5	140	103
22×1.5	140	103
26×1.5	220	162
27×1.5	250	184
33×1.5	400	295
42×1.5	600	443
48×1.5	800	590

Table of tightening torques for plugs with flat gaskets

G-M	Plug tightening torques	
	Nm	lb ft
G 1/8	15	11
G 1/4	33	24
G 3/8	70	52
G 1/2	90	66
G 3/4	150	111
G 1	220	162
G 1 1/4	600	443
G 1 1/2	800	590
10×1	13	10
12×1.5	30	22
14×1.5	40	30
16×1.5	60	44
18×1.5	70	52
20×1.5	90	66
22×1.5	100	74
26×1.5	120	89
27×1.5	150	111
33×1.5	250	184
42×1.5	400	295
48×1.5	500	369



3.7 Troubleshooting



The defects are usually caused by incorrect operation of the machine. Therefore in case of any defect read carefully instructions given in the operation and maintenance manual for your machine and engine. If you cannot identify a cause of the defect, contact the service department of the authorised dealer or the manufacturer.



The troubleshooting in hydraulic and electric systems requires knowledge of hydraulic systems and electrical installations; therefore contact the service department of an authorised dealer or the manufacturer for troubleshooting.

3.7 Troubleshooting

3.7.1 List of error codes displayed on the display

Machine error codes

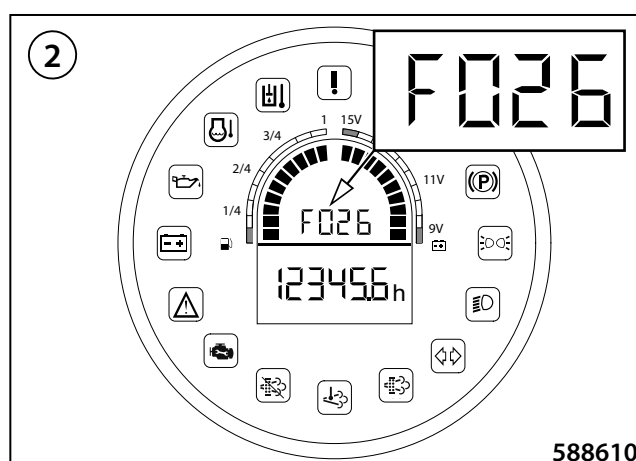
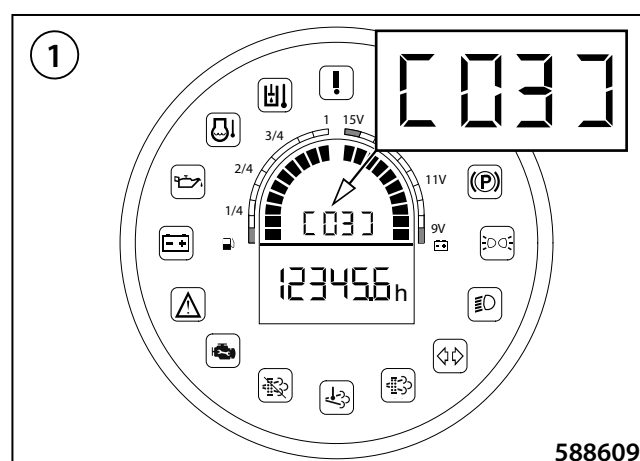
First stage

There are no errors, but warnings of some processes.

Warning on the display	Description
- 11	Seat contact open
- 12	One or both levers are out of Parking brake position
- 16	Immobiliser is active

Second stage

If there are one or more active errors (from the engine or control unit), the display first shows the amount of these errors in square brackets (1) and then the numbers of the errors one by one (2). The errors are thus displayed one by one as long as they are active.



Error on the display	Description
F21	Drive Joystick Right failure
F23	Drive Joystick Left failure (if present)
F25	Sprinkling Potentiometer
F26	[SF] SF5.2 - SafetyFunction Hydraulic temperature sensor diagnostic
F29	Vibro Relays failure
F30	Brake valve failure
F31	Battery voltage lower than 7 V
F32	[SF] SF5.1 - SafetyFunction Hydraulic oil over temperature
F36	Current PWM pump forward - the requested and measured currents of the pump forward magnet are too different from each other.
F37	Current PWM pump backward - the requested and measured currents of the pump forward magnet are too different from each other.
F38	[SF] SF2.9 - SafetyFunction Drive direction (SF_DriveDirection), Wrong drive direction

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Error on the display	Description
F42	Asphalt Temperature sensor failure
F45	CMS frequency out of range
F46	CMS amplitude low
F48	CMS timeout on CAN
F50	[SF] SF2.4 - SafetyFunction Parking brake monitoring
F51	CAN_BUS0 error
F52	CAN_BUS1 (ECU-Engine-Levers) error. Displayed as EBUS.
F53	CAN_BUS2 error
F54	SW failure safety
F55	SW failure non safety
F56	Machine ECU failure
F57	ECU sensor supply failure
F58	Machine ECU temperature out of range
F59	Error list failure
F60	Engine type autodetection failed
F61	Engine CAN communication lost
F62	[HW] Alternator error - P-terminal output not detected
F63	[HW] Engine speed is too high - above SETPOINT_B

Safety function errors

Error on the display	Description
F70	[SF] SF2.1 - SafetyFunction Drive pump diagnostic
F71	[SF] SF2.2 - SafetyFunction Operator presence detection hard ramp
F72	[SF] SF2.3 - SafetyFunction Emergency stop
F73	[SF] SF2.5 - SafetyFunction Drive lever position validation
F74	[SF] SF2.6 - SafetyFunction Parking brake diagnostic
F76	[SF] SF3.1 - SafetyFunction Drive lever crosscheck
F77	[SF] SF3.2 / SF3.7 - SafetyFunction Operator presence detection soft ramp
F78	[SF] SF3.3 - SafetyFunction Gear switch pump limitation
F79	[SF] SF4.1 - SafetyFunction Drive lever CAN validation external input lever right
F80	[SF] SF4.1 - SafetyFunction Drive lever CAN validation
F81	[SF] SF4.2 - SafetyFunction Drive lever Emergency Stop - panic reaction
F82	[SF] SF4.7 - SafetyFunction Drive lever presence
F83	[SF] SF6.1 - SafetyFunction Gear switch crosscheck
F84	[SF] SF7.1 - SafetyFunction Drive lever autodetection

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3.7 Troubleshooting

Pin error reporting

Error on the display	Description
F500	ECU PIN_116 failure Alternator
F501	ECU PIN_159 failure VibrHighOn
F502	ECU PIN_179 failure Sprinkling
F503	ECU PIN_158 failure SprinklingCutter
F504	ECU PIN_157 failure CutterUp
F505	ECU PIN_181 failure CutterDown
F506	ECU PIN_153 failure PumpFW
F507	ECU PIN_177 failure PumpRW
F508	ECU PIN_152 failure Difflock
F509	ECU PIN_151 failure BrakePressure
F510	ECU PIN_162 failure StarterRun
F512	ECU PIN_161 failure FuelValve
F513	ECU PIN_161 failure EngEcuOn
F514	ECU PIN_188 failure PreheatRelay
F515	ECU PIN_114 failure PreheatingIn
F516	ECU PIN_126 failure EngineOverheat
F517	ECU PIN_102 failure EngineOilPressure
F518	ECU PIN_103 failure FuelTank
F519	ECU PIN_122 failure FrontParkingLights
F520	ECU PIN_123 failure LeftDirectionLights
F521	ECU PIN_124 failure StartT50
F522	ECU PIN_111 PIN_135 failure SeatSwitch - Logical Error between pin 0 and 1
F525	ECU PIN_138 failure PreheatingLamp
F526	ECU PIN_146 failure FrontHeadLights
F527	ECU PIN_147 failure RightDirectionLights
F528	ECU PIN_148 failure Immobiliser
F529	ECU PIN_154 failure Fan
F530	ECU PIN_155 failure HornSeat
F531	ECU PIN_191 failure Horn
F532	ECU PIN_173 failure BrakeLight
F533	ECU PIN_176 failure HornBack
F535	ECU PIN_251 failure PumpReturn

Kubota engine errors

Error severity

- High – The engine failure indicator lamp is red.
- Medium – The error message indicator lamp is yellow.
- Low – The emergency stop indicator lamp is yellow.

If an engine error is displayed, stop the machine and contact service.

Error	Description	Error severity
F100	Pressure limiter emergency open	High
F101	SCV(MPROP) stuck	High
F102	Fuel leak (in high pressured fuel system)	High
F103	Rail pressure sensor: Low	High
F104	Rail pressure sensor: High	High
F105	Injector charge voltage: High	High
F106	Open circuit of harness/coil in 1st cylinder injector	High
F107	Open circuit of harness/coil in 3rd cylinder injector	High
F108	Open circuit of harness/coil in 4th cylinder injector	High
F109	Open circuit of harness/coil in 2nd cylinder injector	High
F110	Engine overheat	High
F111	Engine overrun	High
F112	Oil pressure error	High
F113	ECU FLASH ROM error	High
F114	ECU CPU (Main IC) error	High
F115	ECU CPU (Monitoring IC) error	High
F116	Injector charge voltage: Low	High
F117	Open circuit of SCV (MPROP)	High
F118	SCV (MPROP) drive system error	High
F119	Injector drive IC error or Open circuit	High
F120	Internal injector drive circuit short	High
F121	Sensor supply voltage 1: Low	High
F122	Sensor supply voltage 1: High	High
F123	No.1 & 4 cylinder injector short to +B or GND	High
F124	No. 2 & 3cylinder injector short to +B or GND	High
F125	Pressure limiter not open	High
F126	Rail pressure failure after pressure limiter open	High
F127	CAN2 Bus off	High
F128	CAN1 Bus off	High
F129	CAN-KBT Frame error	High
F150	MAF sensor: Low	High
F151	MAF sensor: High	High
F152	Emission deterioration	High
F153	Emergency Exhaust gas temperature sensor 0: High	High
F154	Emergency Exhaust gas temperature sensor 1: High	High
F155	Emergency Exhaust gas temperature sensor 2: High	High
F156	Excessive PM5	High
F157	High exhaust gas temp. after emergency high temp. DTC.	High

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3.7 Troubleshooting

Error	Description	Error severity
F200	NE-G phase shift NE: Crankshaft position sensor G : Camshaft position sensor	Medium
F201	High rail pressure	Medium
F202	Coolant temperature sensor: Low	Medium
F203	Coolant temperature sensor: High	Medium
F204	No input of NE sensor (Crank position sensor) pulse	Medium
F205	NE sensor (Crank position sensor) pulse number error	Medium
F206	+B short of glow relay driving circuit	Medium
F207	Battery voltage: Low	Medium
F208	Battery voltage: High	Medium
F209	+B short circuit of SCV (MPROP)	Medium
F210	Sensor supply voltage 2: Low	Medium
F211	Sensor supply voltage 2: High	Medium
F212	Sensor supply voltage 3: Low	Medium
F213	Sensor supply voltage 3: High	Medium
F214	Accelerator position sensor 1: Low	Medium
F215	Accelerator position sensor 1: High	Medium
F216	Accelerator position sensor 2: Low	Medium
F217	Accelerator position sensor 2: High	Medium
F218	Accelerator position sensor error (CAN)	Medium
F250	Intake air volume: Low	Medium
F251	EGR actuator open circuit	Medium
F252	EGR actuator coil short	Medium
F253	EGR position sensor failure	Medium
F254	Exhaust gas temperature sensor 1: Low	Medium
F255	Exhaust gas temperature sensor 1: High	Medium
F256	Exhaust gas temperature sensor 0: Low	Medium
F257	Exhaust gas temperature sensor 0: High	Medium
F258	Intake throttle feedback error	Medium
F259	Accelerator position sensor correlation error	Medium
F260	EGR actuator valve stuck	Medium
F261	EGR (DC motor) overheat	Medium
F262	EGR (DC motor) temp. sensor failure	Medium
F263	Exhaust gas temperature sensor 2: Low	Medium
F264	Exhaust gas temperature sensor 2: High	Medium
F265	Differential pressure sensor 1: Low	Medium
F266	Differential pressure sensor 1: High	Medium
F267	Intake throttle lift sensor: Low	Medium
F268	Intake throttle lift sensor: High	Medium
F269	Excessive PM3	Medium
F270	Excessive PM4	Medium
F271	Boost pressure low	Medium
F272	All exhaust temp. sensor failure	Medium
F273	High frequency of regeneration	Medium
F274	No communication with EGR	Medium

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Error	Description	Error severity
F300	Intake air temp. error: Low	Low
F301	Intake air temp. error: High	Low
F302	Boost pressure sensor: Low	Low
F303	Boost pressure sensor: High	Low
F304	No input of G sensor (Camshaft position sensor) pulse	Low
F305	G-sensor (Camshaft position sensor) pulse number error	Low
F306	Open circuit of glow relay driving circuit	Low
F307	Ground short of glow relay driving circuit	Low
F308	Glow heater relay driving circuit overheat	Low
F309	QR(IQA) data error	Low
F310	No QR(IQA) data	Low
F311	Main relay is locked in closed position	Low
F312	Ground short of Starter relay driving circuit	Low
F313	Barometric pressure sensor error (Low side)	Low
F314	Barometric pressure sensor error (High side)	Low
F350	Intake air temp. built-in MAF sensor: Low	Low
F351	Intake air temp. built-in MAF sensor: High	Low
F352	EEPROM check sum error	Low
F353	Low coolant temp. in parked regeneration	Low
F354	Parked regeneration time out	Low
F355	Over heat pre-caution	Low
F356	CAN CCVS (ParkingSW and Vehicle speed) frame error	Low
F357	CAN CM1 (Regen SW) frame error	Low
F358	CAN DDC1 (Transmission) frame error	Low
F359	CAN ETC2 (Neutral SW) frame error	Low
F360	CAN ETC5 (Neutral SW) frame error	Low
F361	CAN TSC1 frame error	Low
F362	CAN EBC1 frame error	Low
F363	Error which is out of table. Please connect to ECU and check error with Diagmaster.	Low

3.7 Troubleshooting

Messages displayed on the display

Displayed message	Description of the displayed message	Note
btnCAL	Calibration button pressed	
btn br	Brake test button pressed	
br tSt	Brake test active	
rA SEL	Ramp selection	
HArd	Hard ramp	
SoFt	Soft ramp	
tEMP	Temperature unit selection	
C	Celsius	
F	Fahrenheit	
LEFtLu	Left lever presence selection	
OFF	Off - left lever not present	
On	On - left lever present	
tc SEL	Rear drum type (tandem/combi) selection	
tAndEM	Tandem	
CoMbl	Combi	
Saue	Save (menu item)	
SAuln9	Saving	
SAuEd	Saved	
btnOFF	Off button pressed	
Error	Error when saving new parameters values	
PUMP	Pump calibration (menu item)	
CUrr	Current in mA	Current (to the forward/reverse travel coil) during calibration, the value in [mA] is shown in the upper display
SUCC	Success	The calibration of minimum currents to travel coils successfully completed
FAIL	Failure	Error in the calibration of minimum currents to travel coils – values have not been changed
bAC	Back	One step back in the menu structure
UndEF	Undefined	Unspecified error (contact the service centre)
dPFErr	DPF error	No message about the DPF filter status received from the engine.

3.8 Appendices

Electrical schematics

Legend:

A7 Gessmann right travel lever

S27 Vibration switch
S28 Sprinkling switch
S29 Edge cutter sprinkling switch
S30 Edge cutter selector

A9 Gessmann left travel lever

S31 Vibration switch
S32 Sprinkling switch
S33 Edge cutter sprinkling switch
S34 Edge cutter selector

A4 Bauser display

A1 Fuel gauge indicator (CAN)
A2 Voltage indicator
H1 ERROR indicator lamp (CAN)
H2 Charging indicator lamp (CAN)
H3 Engine oil pressure indicator lamp (CAN)
H4 Coolant temperature indicator lamp (CAN)
H5 Indicator lamp for hydraulic oil temperature (CAN)
H6 Emergency stop indicator lamp (CAN)
H7 Diesel fuel reserve indicator lamp (CAN)
H8 Engine glowing indicator lamp (CAN)
H9 Brake indicator lamp (CAN)
H10 Parking lights indicator lamp (CAN)
H11 Headlamps indicator lamp (CAN)
H12 Indicator lamp for direction indicators (CAN)

A3 Computer HY-TTC 510
A4 Bauser multifunctional display
A5 Infra thermometer
A6 ECU engine
A7 Travel lever – right
A8 Monitoring device
A9 Travel lever – left
A10 Compaction module
A11 Frequency sensor
B3 Hydraulic oil temperature sensor
B4 Fuel level float
B15 Air weight
C1 Noise suppressing filter
E1, 2 Front headlamps
E3 Rear light
E12, 14 Front parking lights
E15, 16 Tail lights
E17, 19 Right direction indicators
E18, 20 Left direction indicators
E21 Warning beacon
E22 Licence plate lighting
E23, 24 Working lights, ROPS
E25, 26 Brake lights
E27 Green beacon
F1-16 Fuses
F21-25 Fuses
F30 Main fuses
F30 Glowing fuse
G1 Battery
G2 Alternator
H13 Horn
H14 Reversing horn
H16 Seat contact delay horn
K1–6 Auxiliary relay
K10 Starter relay
K11 Interrupter
K12, 211 Auxiliary relay
K20 Glowing contactor
M1 Engine starter
M2 Hydraulic oil cooler
M3 Fuel pump
M4 Sprinkling pump
M11 Emulsion sprinkling pump
Q1 Battery disconnecter
R1.1–1.3 Engine glowing
R11 Seat heating
S1 Ignition box

S2 Emergency brake button
S4 Sprinkling potentiometer
S5 Drive mode switch
S6 Automatic vibration switch
S7 Vibration switch, rear
S9 Headlamps switch
S10 Rear lights switch
S11 Warning lights switch
S12 Direction indicators switch
S15 Differential lock switch
S18 Seat switch
S20 Regeneration switch
S22 Brake pressure switch
S23
S24 Horn switch
S25 Brake test switch
S26 Calibration switch
S40 Vibration mode switch
S41 Seatbelt switch
V1 Diode
X3, X4, X5 Engine connectors
X35 Machine diagnostics socket
X36 Engine diagnostic socket
Y1
Y2 Brake valve electromagnet
Y3 Valve electromagnet, forward travel
Y4 Valve electromagnet, reverse travel
Y5 Vibration valve electromagnet, front
Y6 Vibration valve electromagnet, rear
Y7 Vibration valve electromagnet – big (ARX4)
Y8 Vibration valve electromagnet – small (ARX4)
Y9 Sprinkling pump valve electromagnet
Y11 Quantity divider valve electromagnet
Y12 Valve electromagnet of the edge cutter – up
Y13 Valve electromagnet of the edge cutter – down
Y14 Valve electromagnet of the edge cutter – sprinkling

(*) Optional equipment

(**) not available

3.8 Appendix



38177D_1en

Electrical schematics

Legend:

A7 Gessmann right travel lever

- S27 Vibration switch
- S28 Sprinkling switch
- S29 Edge cutter sprinkling switch
- S30 Edge cutter selector

A9 Gessmann left travel lever

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- S32 Sprinkling switch
- S33 Edge cutter sprinkling switch
- S34 Edge cutter selector

A4 Bauser display

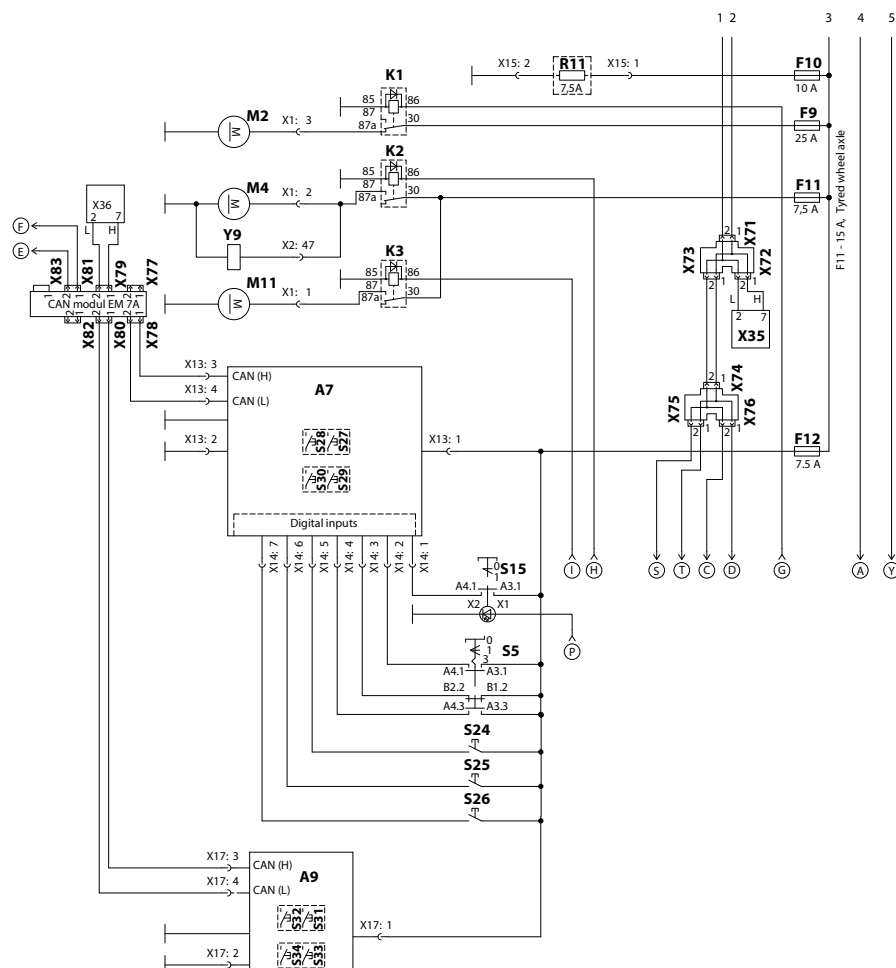
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- F21-25 Fuses
- F30 Main fuses
- F30 Glowing fuse
- G1 Battery
- G2 Alternator
- H13 Horn
- H14 Reversing horn
- H16 Seat contact delay horn
- K1–6 Auxiliary relay
- K10 Starter relay
- K11 Interrupter
- K12, 211 Auxiliary relay
- K20 Glowing contactor
- M1 Engine starter
- M2 Hydraulic oil cooler
- M3 Fuel pump
- M4 Sprinkling pump
- M11 Emulsion sprinkling pump
- Q1 Battery disconnecter
- R1.1–1.3 Engine glowing
- R11 Seat heating
- S1 Ignition box

- S2 Emergency brake button
- S4 Sprinkling potentiometer
- S5 Drive mode switch
- S6 Automatic vibration switch
- S7 Vibration switch, rear
- S9 Headlamps switch
- S10 Rear lights switch
- S11 Warning lights switch
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- S18 Seat switch
- S20 Regeneration switch
- S22 Brake pressure switch
- S23
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- Y12 Valve electromagnet of the edge cutter – up
- Y13 Valve electromagnet of the edge cutter – down
- Y14 Valve electromagnet of the edge cutter – sprinkling

(*) Optional equipment

(**) not available



Electrical schematics

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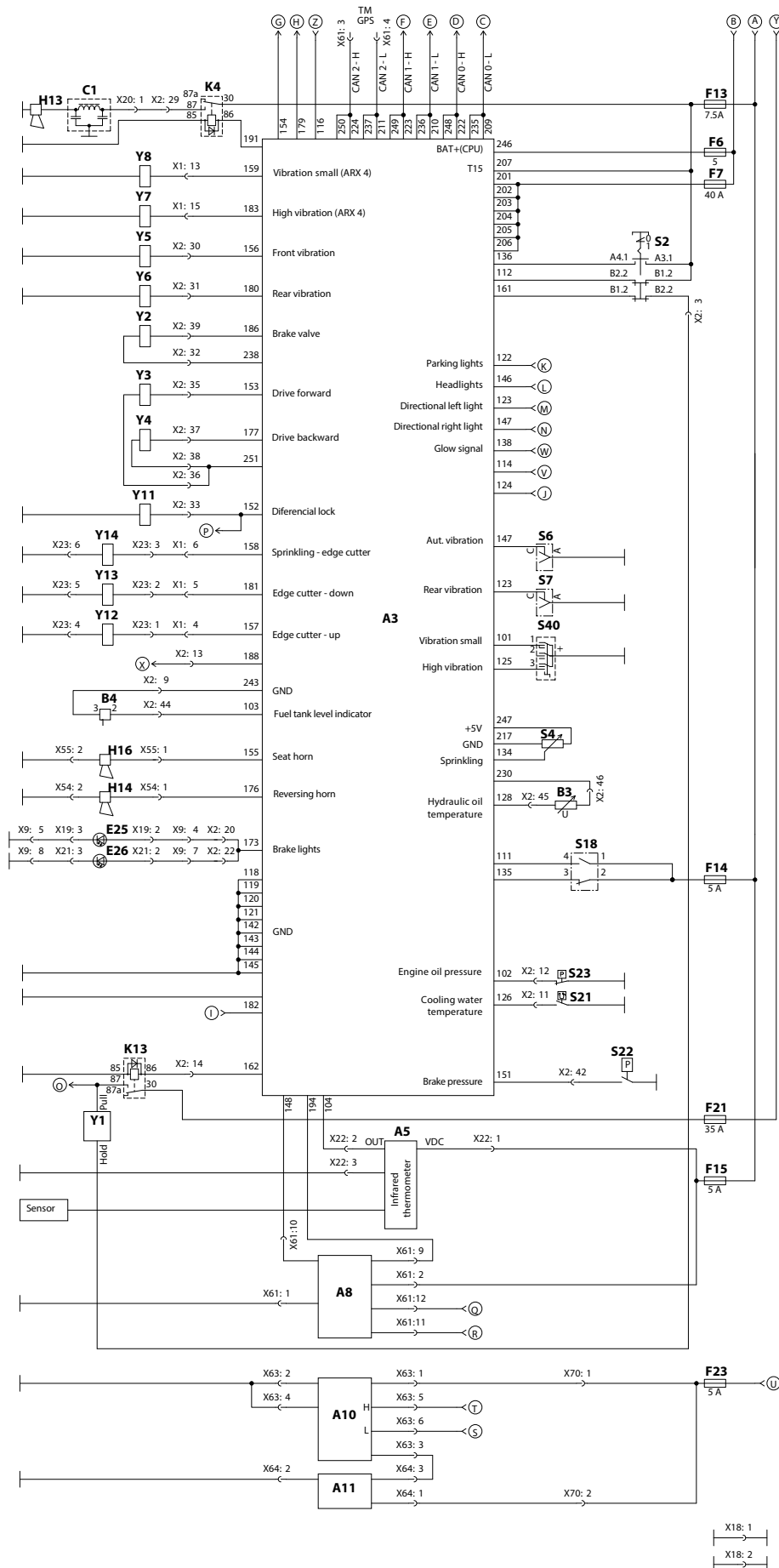
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- Y6 Vibration valve electromagnet, rear
- Y7 Vibration valve electromagnet – big (ARX4)
- Y8 Vibration valve electromagnet – small (ARX4)
- Y9 Sprinkling pump valve electromagnet
- Y11 Quantity divider valve electromagnet
- Y12 Valve electromagnet of the edge cutter – up
- Y13 Valve electromagnet of the edge cutter – down
- Y14 Valve electromagnet of the edge cutter – sprinkling

(*) Optional equipment

(**) not available

3.8 Appendix

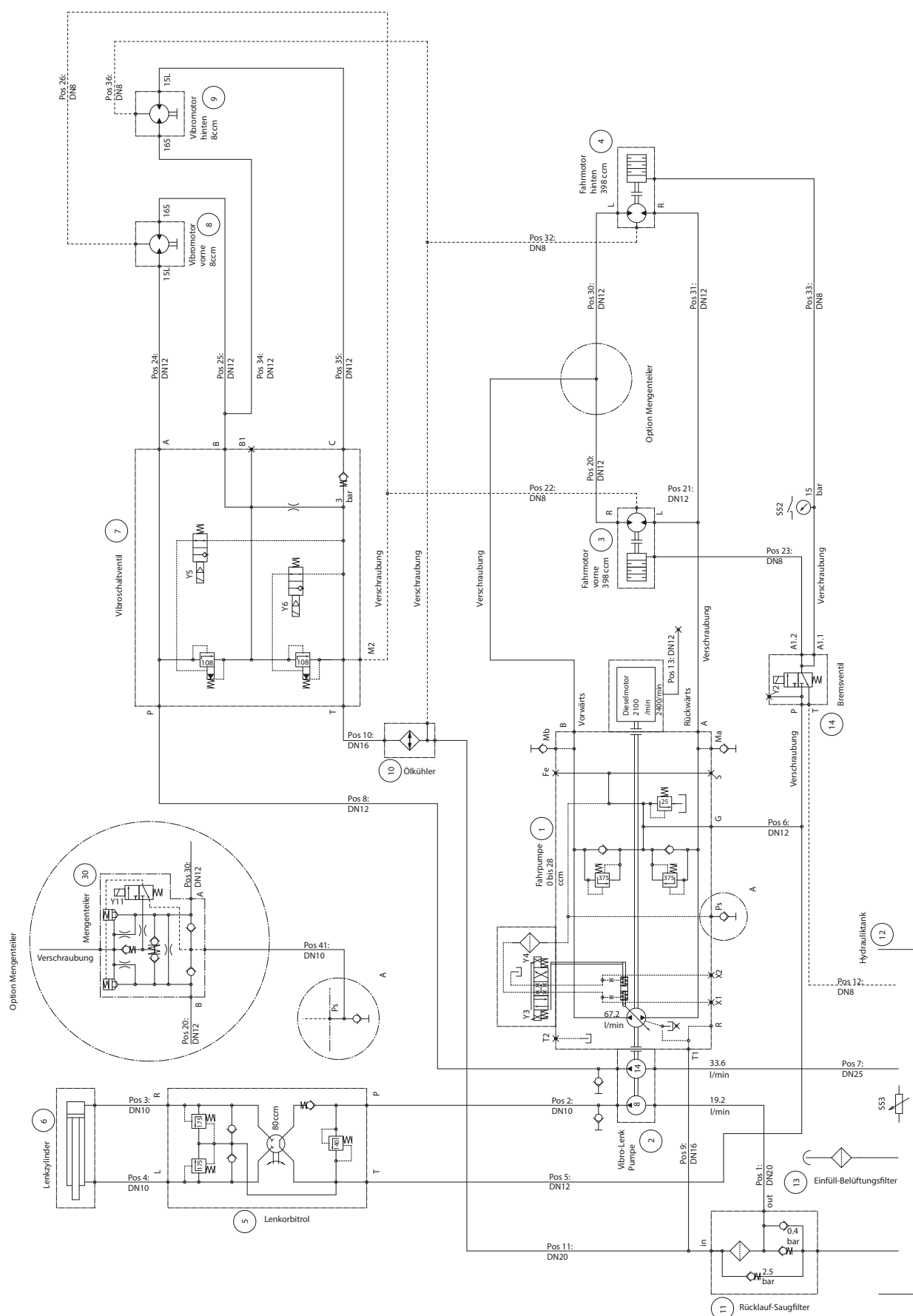


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Hydraulic diagram ATR 23, ATR 26**Legend:**

- 1 Travel pump
- 2 Pump, vibration, steering
- 3 Travel engine, front
- 4 Travel engine, rear
- 5 Steering unit (Orbitrol)
- 6 Steering cylinder
- 7 Vibration switching valve
- 8 Vibration motor, front
- 9 Vibration motor, rear
- 10 Oil cooler
- 11 Suction return filter
- 12 Hydraulic oil tank
- 13 Input ventilation filter
- 14 Brake valve
- 15 Travel engine, rear left
- 16 Travel engine, rear right

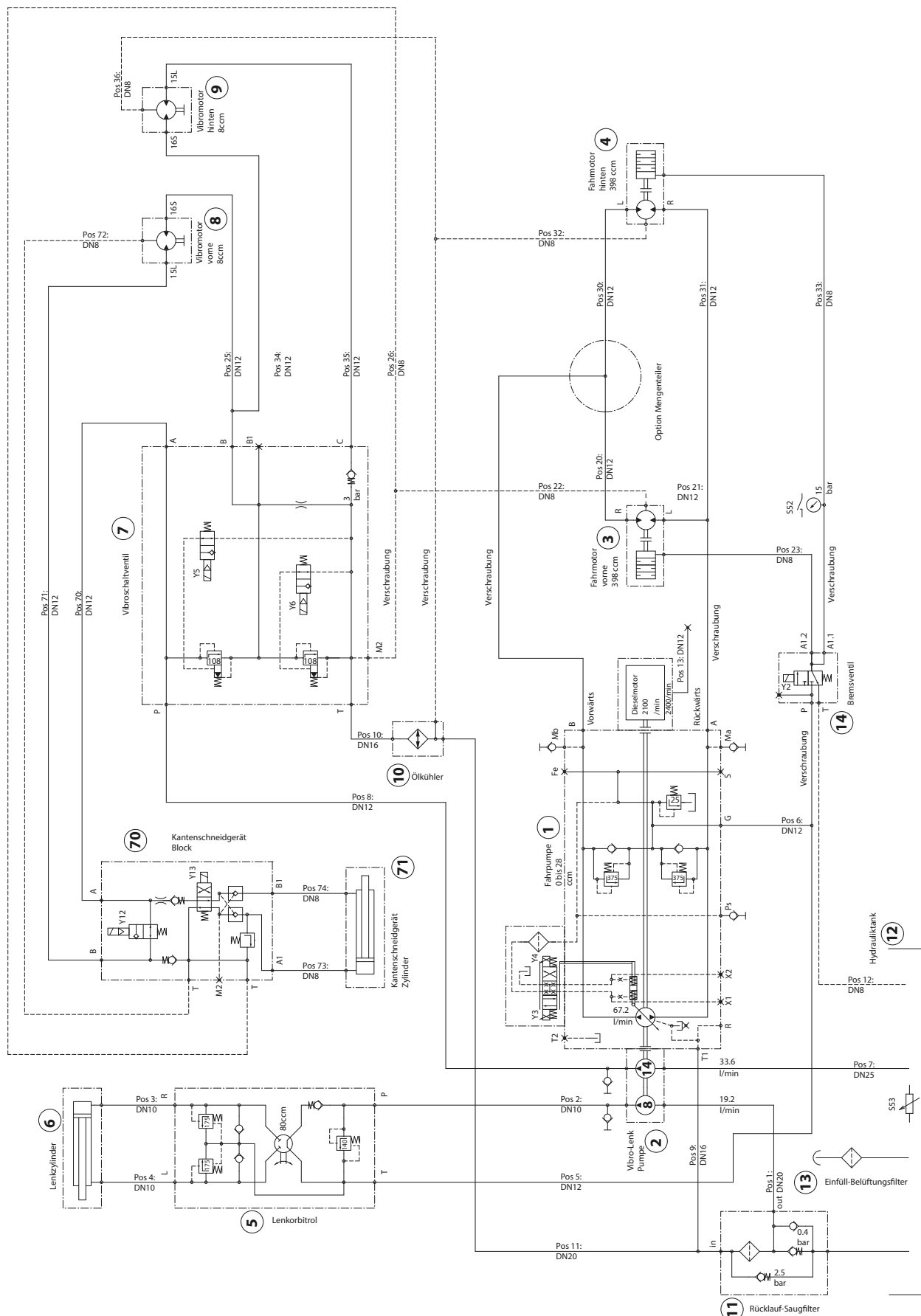
3.8 Appendix



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Hydraulic diagram – Edge cutter**Legend:**

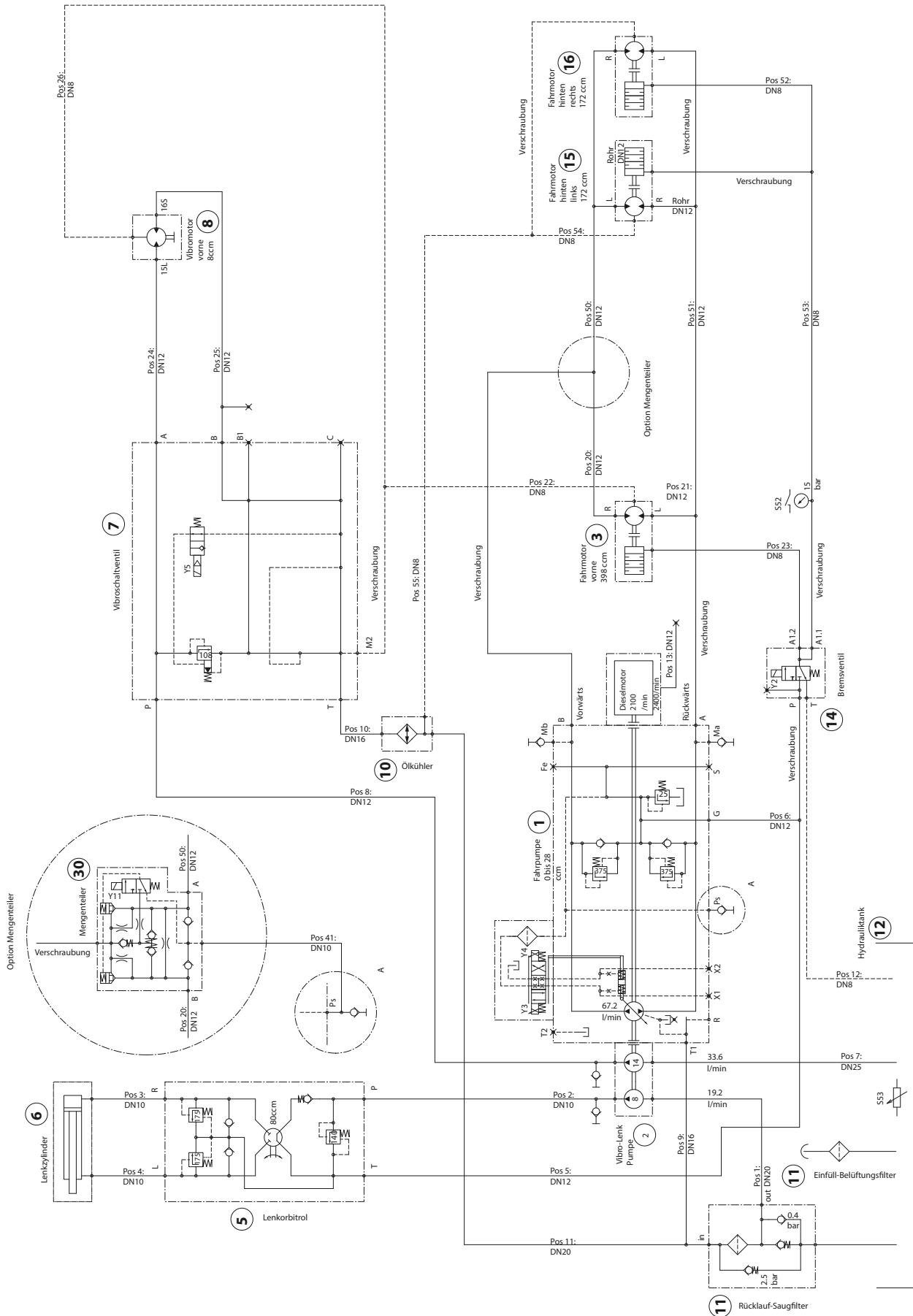
- 1 Travel pump
- 2 Pump, vibration, steering
- 3 Travel engine, front
- 4 Travel engine, rear
- 5 Steering unit (Orbitrol)
- 6 Steering cylinder
- 7 Vibration switching valve
- 8 Vibration motor, front
- 9 Vibration motor, rear
- 10 Oil cooler
- 11 Suction return filter
- 12 Hydraulic oil tank
- 13 Input ventilation filter
- 14 Brake valve
- 30 Quantity divider
- 70 Edge cutter – unit
- 71 Edge cutter – cylinder



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Hydraulic diagram ATR 23, ATR 26**Legend:**

- 1 Travel pump
- 2 Pump, vibration, steering
- 3 Travel engine, front
- 4 Travel engine, rear
- 5 Steering unit (Orbitrol)
- 6 Steering cylinder
- 7 Vibration switching valve
- 8 Vibration motor, front
- 9 Vibration motor, rear
- 10 Oil cooler
- 11 Suction return filter
- 12 Hydraulic oil tank
- 13 Input ventilation filter
- 14 Brake valve
- 15 Travel engine, rear left
- 16 Travel engine, rear right



1193807

Table of spare parts for regular maintenance

Chapter	Spare part	Order number
3.6.12	Fan	1448212
3.6.18	Fuel filter cartridge	1503944
3.6.21	Fuel filter	1503943
3.6.22	Engine oil filter	1504183
3.6.29	Fuel filter cartridge	1503944
3.6.33	Set of hydraulic oil filters	1182946
3.6.34	Air filter cartridge, external	1232013
3.6.34	Air filter cartridge, internal	4-5358520090
3.6.35	Drum rubber-metal element	1175152
3.6.35	Engine rubber-metal element	1-491740
3.6.35	Engine rubber-metal element	1-491741
3.6.44	Gas strut	1448823

3.8 Appendix

Content of the filter set after 250 hours (4-760243)

Chapter	Spare part	Number of parts	Order number
3.6.21	Fuel filter	1	1503943
3.6.22	Engine oil filter	1	1504183

Content of the filter set after 500 hours (4-760244)

Chapter	Spare part	Number of parts	Order number
3.6.21	Fuel filter	1	1503943
3.6.22	Engine oil filter	1	1504183
3.6.29	Fuel filter cartridge	1	1503944
3.6.33	Set of hydraulic oil filters	1	1182946

Content of the filter set after 1000 hours (4-760258)

Chapter	Spare part	Number of parts	Order number
3.6.21	Fuel filter	1	1503943
3.6.22	Engine oil filter	1	1504183
3.6.29	Fuel filter cartridge	1	1503944
3.6.33	Set of hydraulic oil filters	1	1182946
3.6.34	Air filter cartridge, external	1	1232013
3.6.34	Air filter cartridge, internal	1	4-5358520090

