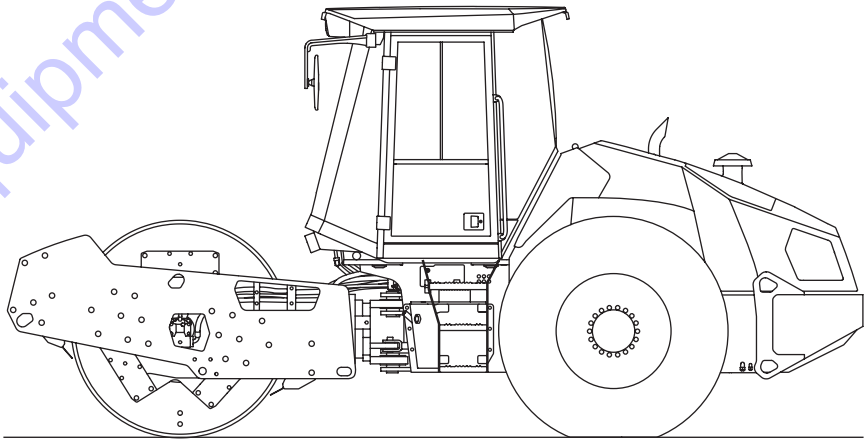
ARS 110

SINGLE-DRUM ROLLER
DEUTZ TCD3.6 L4
EU Stage IV / U.S. EPA Tier 4f



OPERATING MANUAL

EDITION 07/2024 EN
Product Identification Number 3094035 -

AMMANN

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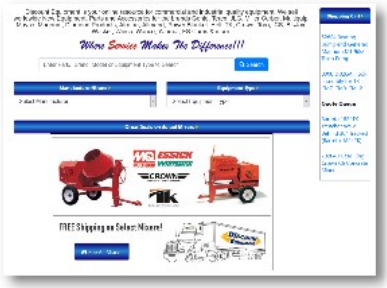

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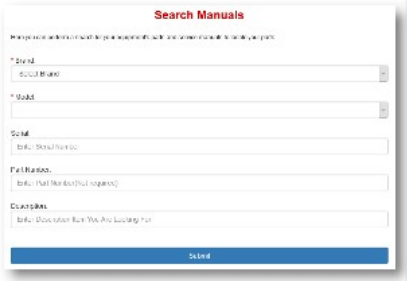

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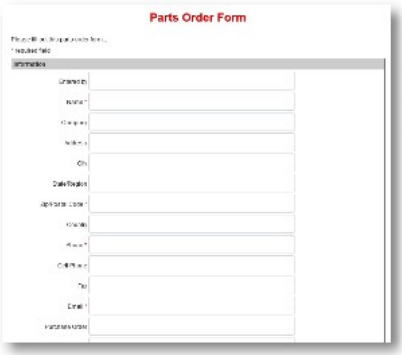

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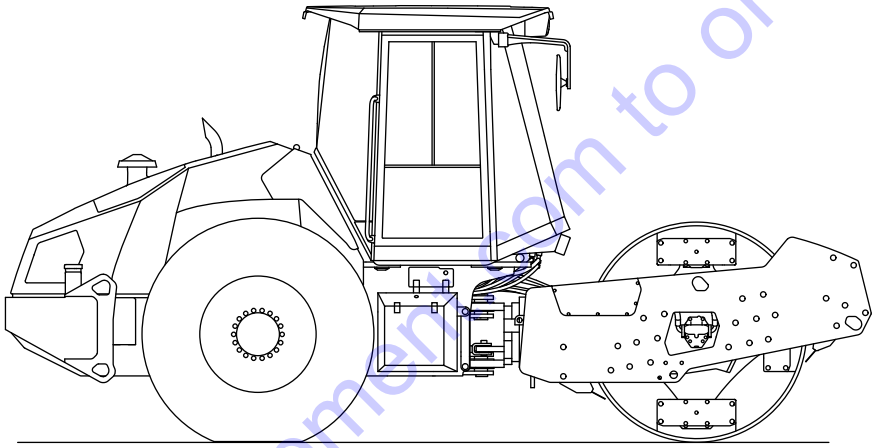
Congratulations on your purchase of the AMMANN compaction machine. This modern compaction machine is characterised by simple operation and maintenance and is the product of many years of experience of the AMMANN company in compaction machines, especially road rollers. In order to avoid faults due to improper operation and maintenance, we request you to read this operating manual with great care and keep it for later reference.

With kind regards,

Ammann Czech Republic s. r. o. | Náchodská 145 | CZ–549 01 Nové Město nad Metují
☏ + 420 491 476 111 | Fax + 420 491 470 215 | info@ammann.com | www.ammann.com



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This instruction manual is a "translation of the original instruction manual" within the meaning of the paragraph 1.7.4.1 of the Directive of the European parliament and of the Council 2006/42/EC of 17 Mai 2006.

This 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.

AMMANN 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.

In order to ensure smooth operation of the AMMANN compaction equipment, use only original spare parts supplied by AMMANN 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.

Ammann Czech Republic s. r. o. 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.

SAFETY NOTICES AND SIGNS:

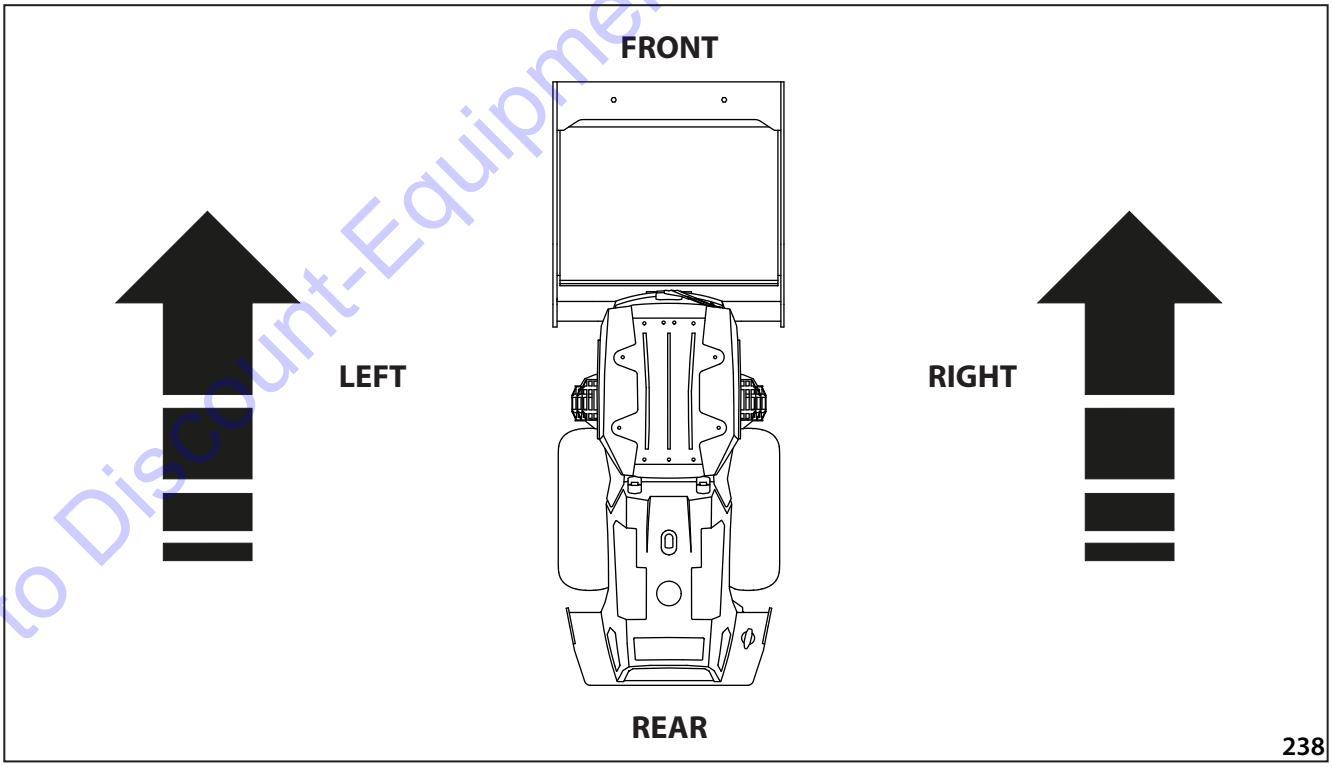
The notice warns of a serious risk of personal injury or other personal hazards.

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.



Contents

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1 SPECIFICATION MANUAL

ARS 110
(Deutz Tier 4 Final)

1.1 Basic data

Machine description

Single-drum roller with an articulated frame with a front smooth drum or a pad-foot steel driven vibratory drum and a rear driven axle with two tyres with tread pattern. Steering using the articulated frame.

Machine application

ARS 110 rollers are suitable for medium and large-sized compaction works in transport construction (motorways, railways, airfields), water resources construction (rockfill dams), and building construction (industrial zones, harbours), etc.

ARS 110 D roller with a smooth drum is suitable for the compaction of all kinds of soils. It is possible to be used for the compaction of clay soils up to a layer thickness (after compaction) of 25 cm (9.8 in), loam soils up to a layer thickness of 40 cm (15.7 in), mixed soils up to a layer thickness of 50 cm (19.7 in), sandy and gravel materials up to a layer thickness of 60 cm (23.6 in), and rockfill up to a layer thickness of 80 cm (31.4 in). The maximum permissible grain size in a loose layer is 2/3 of the layer thickness. The roller can also be used for compaction by means of stabilisation.

ARS 110 PD roller with a padfoot drum (synchronous kneading and vibrating effect) is suitable for the compaction of clay soils up to a layer thickness (after compaction) of 30 cm (11.8 in), loam soils up to a layer thickness of 40 cm (15.7 in), and mixed soils up to a layer thickness of 50 cm (19.7 in).

ARS 110 HX roller for permanently difficult conditions and on slopes above 30% – smooth drum.

ARS 110 HXPD roller for permanently difficult conditions and on slopes above 30% – padfoot drum.

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 $g.m^{-3}$.

The standard type of the machine is not intended for road traffic. For more information, please contact your dealer.

Please fill in the following data:

(see nameplate and Deutz engine nameplate)

Machine type

.....

Product Identification Number

.....

Year of manufacture

.....

Engine type

.....

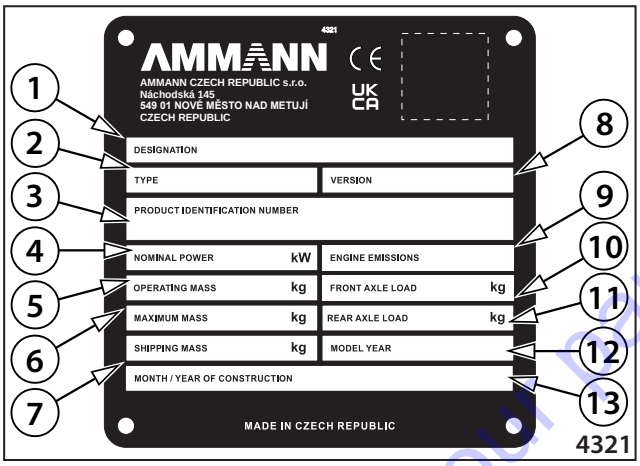
Serial number of the engine

.....

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

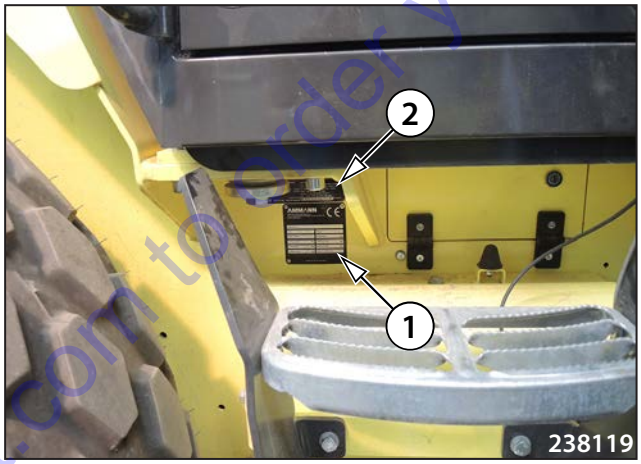
The machine that complies with the health and safety requirements is provided with a nameplate with CE marking.

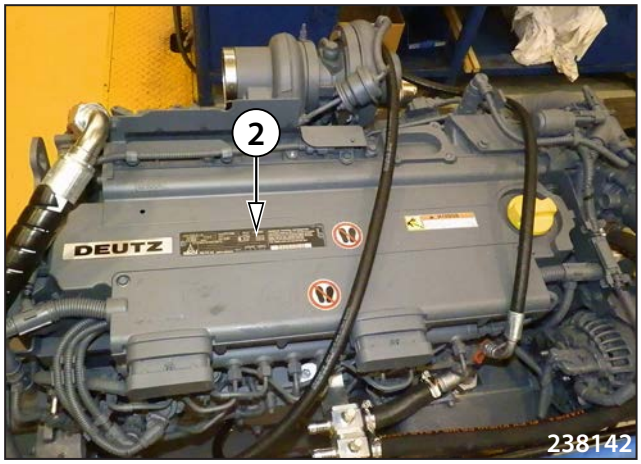
1. Name – always mentioned only in the English version
2. Type
3. Product identification number
4. Rated power
5. Operating weight
6. Maximum weight
7. Shipping weight
8. Version
9. Engine emissions
10. Front axle load
11. Rear axle load
12. Model year
13. Month/year of manufacture



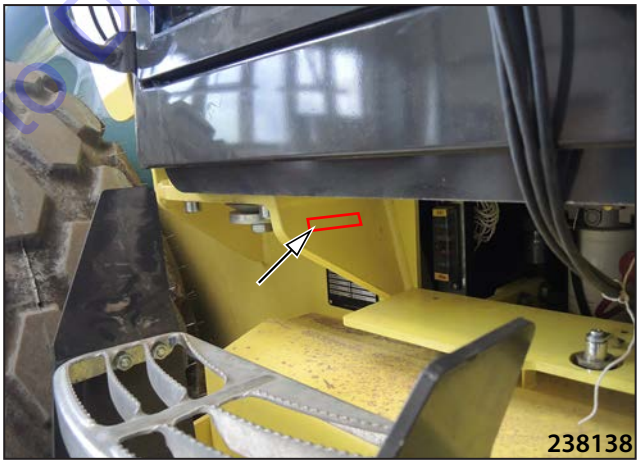
Nameplate position (1)

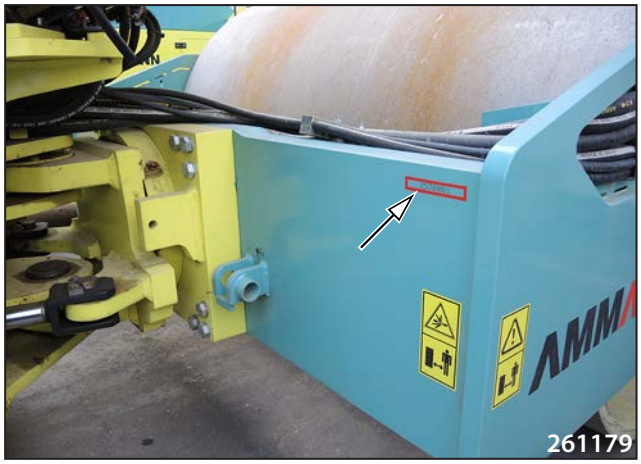
Engine nameplate position (2)





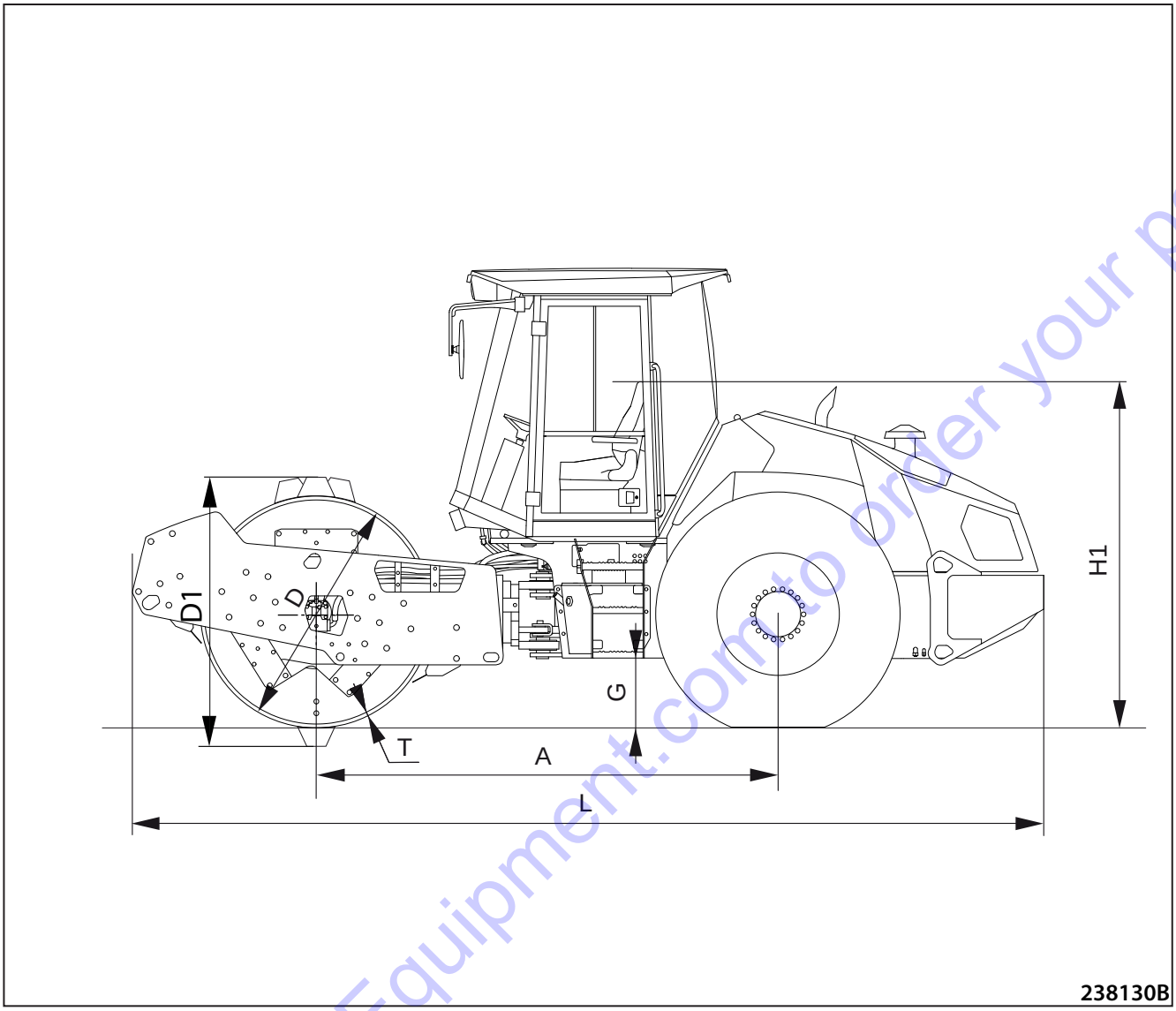
Machine frame number





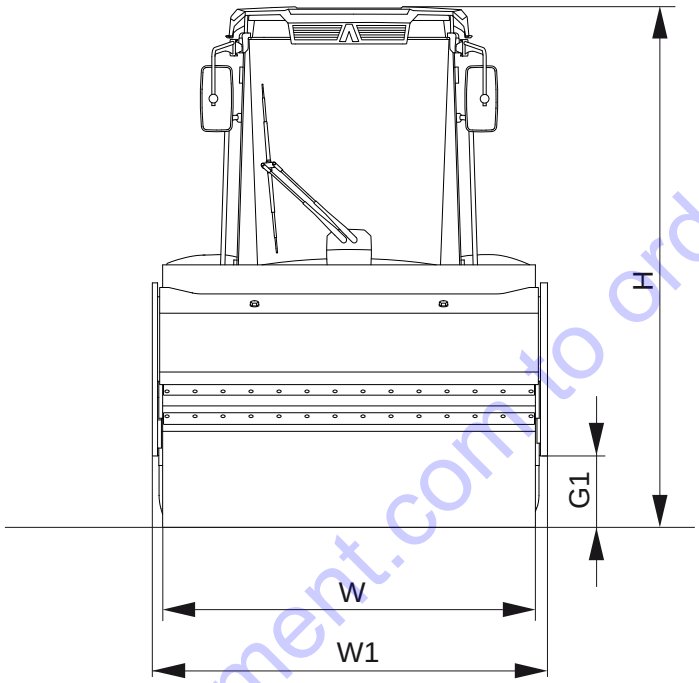
1.2 Dimensional drawing of the machine

Dimensional drawing of the machine ARS 110



mm (in)	A	D	D1	G	G1	H	H1	L	T	W	W1
ARS 110 D	2990	1500	1716	430	400	2970	2200	5900	25	2130	2260
	(117.7)	(59.1)	(67.6)	(16.9)	(15.7)	(116.9)	(86.6)	(232.3)	(1.0)	(83.9)	(89.0)
ARS 110 PD	2990	1490	1694	430	400	2970	2200	5900	20	2130	2260
	(117.7)	(58.7)	(66.7)	(16.9)	(15.7)	(116.9)	(86.6)	(232.3)	(0.8)	(83.9)	(89.0)

Dimensional drawing of the machine ARS 110



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mm (in)	A	D	D1	G	G1	H	H1	L	T	W	W1
ARS 110 D	2990	1500	1716	430	400	2970	2200	5900	25	2130	2260
	(117.7)	(59.1)	(67.6)	(16.9)	(15.7)	(116.9)	(86.6)	(232.3)	(1.0)	(83.9)	(89.0)
ARS 110 PD	2990	1490	1694	430	400	2970	2200	5900	20	2130	2260
	(117.7)	(58.7)	(66.7)	(16.9)	(15.7)	(116.9)	(86.6)	(232.3)	(0.8)	(83.9)	(89.0)

1.3 Technical data

		ARS 110 T4f			
		D	HX	PD	HXPD
Weight					
Operating weight of EN 500-1+A1 (CECE) with cab, ROPS	kg (lb)	10860 (23940)	10950 (24140)	11485 (25320)	11575 (25520)
Operating weight of EN 500-1+A1 (CECE) with platform, rail	kg (lb)	10795 (23800)	10865 (23950)	11420 (25180)	11510 (25380)
Operating load of EN 500-1+A1 (CECE) with cab, ROPS on front axis	kg (lb)	6450 (14220)	6520 (14370)	7075 (15600)	7145 (15750)
Operating load of EN 500-1+A1 (CECE) with cab, ROPS on rear axis	kg (lb)	4410 (9720)	4430 (9770)	4410 (9720)	4430 (9770)
Weight of half fluid capacities	kg (lb)	160 (350)	160 (350)	160 (350)	160 (350)
Operating weight of ISO 6016 with cab, ROPS	kg (lb)	11020 (24290)	11110 (24490)	11645 (25670)	11735 (25870)
Maximum weight with the cab, ROPS, accessories, weighing	kg (lb)	14630 (32250)	14720 (32450)	13740 (30290)	13830 (30490)
Maximum permitted weight according to ROPS	kg (lb)	19000 (41890)	19000 (41890)	19000 (41890)	19000 (41890)
Static linear load of front drum	kg/cm (lb/in)	30,3 (169,6)	-	33,2 (186)	-
Cab weight	kg (lb)	825 (1820)	825 (1820)	825 (1820)	825 (1820)
Weight of the platform with railing and canopy (ROPS/FOPS)	kg (lb)	760 (1680)	760 (1680)	760 (1680)	760 (1680)
Weight of blade	kg (lb)	895 (1970)	895 (1970)	895 (1970)	895 (1970)
Weight of 2 padfoot segments	kg (lb)	1515 (3340)	1515 (3340)	-	-
Weight of tyre filling -25°C	kg (lb)	1200 (2650)	1200 (2650)	1200 (2650)	1200 (2650)
Driving characteristics					
Number of speeds	-	5+1	4+1	5+1	4+1
Maximum transport speed 5 (4)	km/h (MPH)	12 (7,5)	10 (6,2)	12 (7,5)	10 (6,2)
Working speed 1	km/h (MPH)	2,5 (1,6)	2,2 (1,4)	2,5 (1,6)	2,2 (1,4)
Working speed 2	km/h (MPH)	3,7 (2,3)	3,3 (2,1)	3,7 (2,3)	3,3 (2,1)
Working speed 3	km/h (MPH)	5 (3,1)	5,1 (3,2)	5 (3,1)	5,1 (3,2)
Working speed 4	km/h (MPH)	7,6 (4,7)	-	7,6 (4,7)	-
Loading mode 0	km/h (MPH)	3 (1,9)	3 (1,9)	3 (1,9)	3 (1,9)
Climbing ability	%	52	67	54	67
Climbing ability with vibration	%	50	55	50	55
Lateral static stability	%	72	72	72	72
Lateral stability during driving without vibration	%	25	25	25	25
Lateral stability during driving with vibration	%	15	15	15	15
Maximum gradient when towing machine on slope	%	60	60	60	60
Turning radius inner (edge)	mm (in)	3625 (142,7)	3625 (142,7)	3625 (142,7)	3625 (142,7)
Turning radius outer (contour)	mm (in)	6365 (250,6)	6365 (250,6)	6365 (250,6)	6365 (250,6)
Front approach slope	%	88	88	120	120
Rear approach slope	%	47	47	43	43
Type of drive	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
Number of driving axles	-	2	2	2	2
Oscillation angle	°	10	10	10	10
Angle of steering	°	36	36	36	36

		ARS 110 T4f			
		D	HX	PD	HXPD
Steering					
Type of steering	-	Joint	Joint	Joint	Joint
Steering control	-	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Linear hydraulic motors	-	2	2	2	2
Engine					
Manufacturer	-	Deutz	Deutz	Deutz	Deutz
Type	-	TCD3.6 L4	TCD3.6 L4	TCD3.6 L4	TCD3.6 L4
Power according to ISO 14396	kW (HP)	100 (134)	100 (134)	100 (134)	100 (134)
Number of cylinders	-	4	4	4	4
Cylinder capacity	cm^3 (cu in)	3621 (221)	3621 (221)	3621 (221)	3621 (221)
Nominal speed	min^{-1} (RPM)	2200	2200	2200	2200
Maximum torque	Nm/rpm	500/1600	500/1600	500/1600	500/1600
Average fuel consumption	l/h (gal US/h)	11,6 (3,1)	11,6 (3,1)	11,6 (3,1)	11,6 (3,1)
DEF (AdBlue) consumption	l/h (gal US/h)	0,32 (0,1)	0,32 (0,1)	0,32 (0,1)	0,32 (0,1)
Engines complies with emission regulations	-	EU Stage IV, U.S. EPA Tier 4 Final	EU Stage IV, U.S. EPA Tier 4 Final	EU Stage IV, U.S. EPA Tier 4 Final	EU Stage IV, U.S. EPA Tier 4 Final
Cooling system of engine	-	Liquid	Liquid	Liquid	Liquid
Maximum permitted speed during engine braking	min^{-1} (RPM)	3050	3050	3050	3050
Axle					
Maximum tyre pressure	MPa (PSI)	0,16 (23,2)	0,16 (23,2)	0,16 (23,2)	0,16 (23,2)
Pattern of tyres	-	UK 5 Diamond	UK 5 Diamond	TD-01 Tractor	TD-01 Tractor
Number of tyres	-	2	2	2	2
Number of rear wheels	-	2	2	2	2
Size of tyres	-	23,1x26´´	23,1x26´´	23,1x26´´	23,1x26´´
Type of tyres	-	Tubeless	Tubeless	Tubeless	Tubeless
Number of pads (only PD version)	-	-	-	140	140
Pad contact surface (only PD version)	cm^2 (sq in)	-	-	120 (18,6)	120 (18,6)
Pad height (only PD version)	mm (in)	-	-	100 (3,9)	100 (3,9)
Brakes					
Operating	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
Parking	-	Multiple-disc spring brake	Multiple-disc spring brake	Multiple-disc spring brake	Multiple-disc spring brake
Emergency	-	Multiple-disc spring brake	Multiple-disc spring brake	Multiple-disc spring brake	Multiple-disc spring brake
Vibration					
Frequency I	Hz (VPM)	31 (1860)	31 (1860)	31 (1860)	31 (1860)
Frequency II	Hz (VPM)	35 (2100)	35 (2100)	35 (2100)	35 (2100)
Amplitude I	mm (in)	1,96 (0,077)	1,96 (0,077)	1,7 (0,067)	1,7 (0,067)
Amplitude II	mm (in)	0,83 (0,033)	0,83 (0,033)	0,72 (0,028)	0,72 (0,028)
Centrifugal force I	kN	285	285	285	285
Centrifugal force II	kN	155	155	155	155
Type of drive	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic

1.3 Technical data

		ARS 110 T4f			
		D	HX	PD	HXPD
Fluid capacities					
Fuel	l (gal US)	345 (91,1)	345 (91,1)	345 (91,1)	345 (91,1)
Engine (oil filling)	l (gal US)	10 (2,6)	10 (2,6)	10 (2,6)	10 (2,6)
Cooling system	l (gal US)	32,5 (8,6)	32,5 (8,6)	32,5 (8,6)	32,5 (8,6)
Hydraulic system	l (gal US)	76 (20,1)	76 (20,1)	76 (20,1)	76 (20,1)
Drum vibrator	l (gal US)	7,3 (1,9)	7,3 (1,9)	7,3 (1,9)	7,3 (1,9)
Drum cooling liquid (up to -25°C)	l (gal US)	60 (15,9)	60 (15,9)	60 (15,9)	60 (15,9)
Wheel gearbox	l (gal US)	1,5 (0,4)	1,7 (0,4)	1,5 (0,4)	1,7 (0,4)
Drum gearbox	l (gal US)	1,5 (0,4)	2,6 (0,7)	1,5 (0,4)	2,6 (0,7)
Washer tank	l (gal US)	2,75 (0,7)	2,75 (0,7)	2,75 (0,7)	2,75 (0,7)
Gear + vibrator box (joint filling) of ACE	l (gal US)	25,5 (6,7)	25,5 (6,7)	25,5 (6,7)	25,5 (6,7)
ACE drum cooling liquid	l (gal US)	100 (26,4)	100 (26,4)	100 (26,4)	100 (26,4)
DEF (AdBlue) Tank	l (gal US)	22 (5,8)	22 (5,8)	22 (5,8)	22 (5,8)
Wiring					
Voltage	V	24	24	24	24
Battery capacity	Ah	2x90	2x90	2x90	2x90
Noise and vibration emissions					
Measured sound power level A, L_{pA} at the operator's position (cab) *	dB	78	78	78	78
Uncertainty K_{pA} *	dB	2	2	2	2
Guaranteed sound power level A, L_{WA} **	dB	108	108	108	108
Declared highest weighted effective value of vibration acceleration transmitted to the whole body (cab) ***	m/s^2 (ft/s^2)	<0,5 (<1,6)	<0,5 (<1,6)	<0,5 (<1,6)	<0,5 (<1,6)
Declared total value of vibration acceleration transmitted to hands (cab) ***	m/s^2 (ft/s^2)	<4,1 (<13,5)	<4,1 (<13,5)	<4,1 (<13,5)	<4,1 (<13,5)

* measured according to EN 474-13:2022

** measured according to DIRECTIVE 2000/14/EC and EN ISO 3744:2010

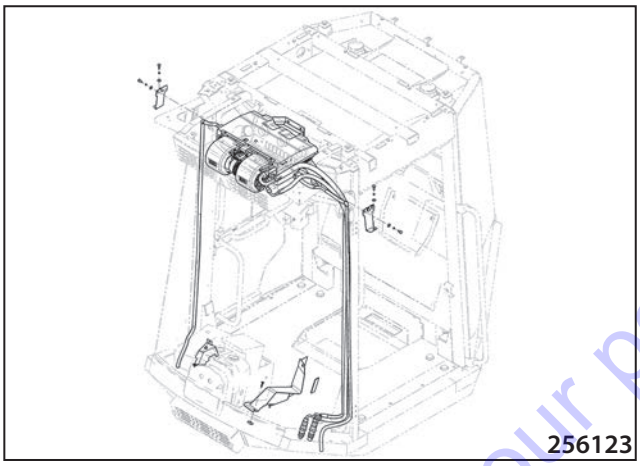
*** measured according to EN 1032:2003+A1:2008 while driving with vibration on gravel foundation

Air-conditioning (see Chap. 1.4.1)
Preparation for antenna radio and loudspeakers
Radio
Reverse alarm
Warning beacon (see Chap. 1.4.2)
Licence plate holder
Road traffic lighting (including direction lights)
Night operation lighting
ATC inter-axle lock
Additional padfoot segments (recommended with ATC and tractor tyres) (see Chap. 1.4.3)
Blade (see Chap. 1.4.4)
Tyre ballasting with liquid up to -25 °C
Air pre-filter
Padlock latch over the fuel tank
ACEecon
ACE Force (see Chap. 1.4.5)
Telematic preparation
Telematic (see Chap. 1.4.6)
Tachograph preparation
Tachograph (see Chap. 1.4.8)
Tractor tyres
Triangle for slow-moving vehicles
Fire extinguisher (see Chap. 1.4.7)
Set of filters, 500 h
Set of filters, 1000 h
Set of filters, 2000 h
Biodegradable hydraulic oil
Amman tool kit
Special colour design
Certificate of Origin
Additional documentation set
Topcon

1.4 Optional equipment

1.4.1 Air conditioning

The air-conditioning is a special cooling system for the operator's workplace to provide comfort and stable temperature also in extremely hot weather. The operator is able to control and precisely regulate the temperature at the workplace using controls in the upper part of the cab.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1.4.2 Beacon

The beacon is a safety device used for limiting or preventing potential hazards when working with the machine.


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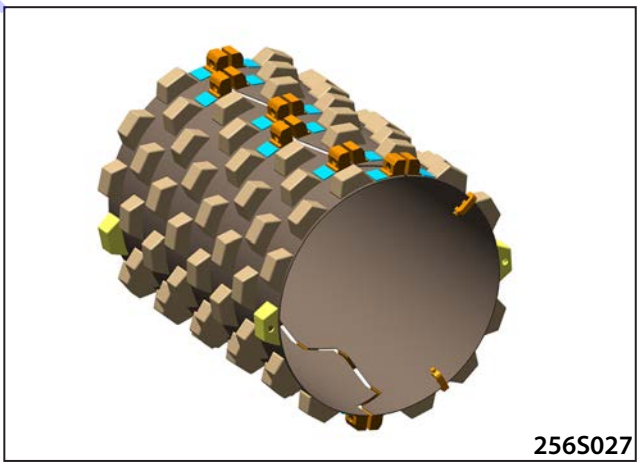
1.4.3 Padfoot segments

They are used for changing a smooth drum to a padfoot drum. The padfoot drum is suitable for compacting clay soils with simultaneous kneading and vibrating effect.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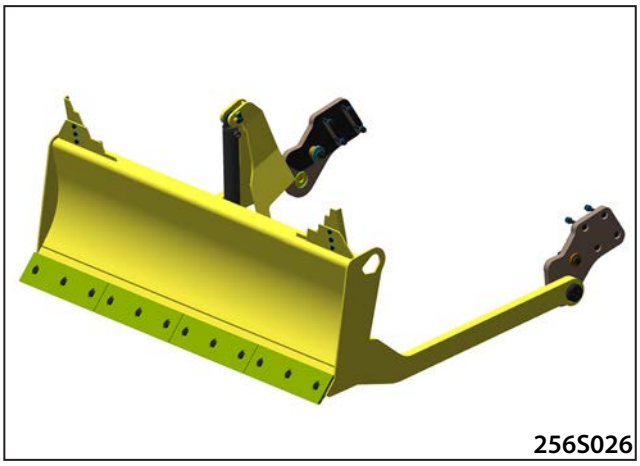
1.4.4 Blade

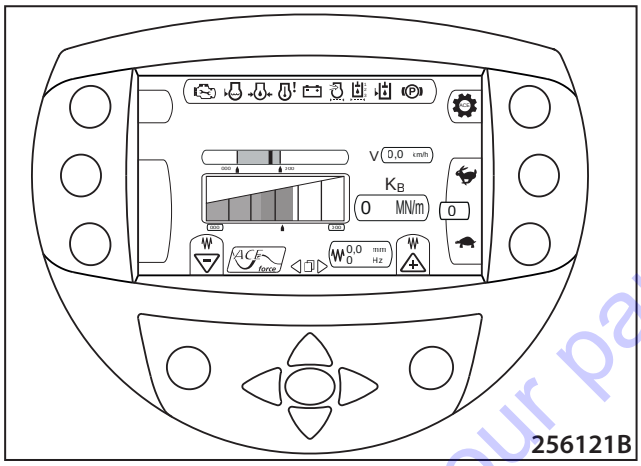
It is used for spreading brought in materials.


256S026

1.4.5 ACE FORCE

The unique measuring ACE FORCE system is able to evaluate data in real time and significantly reduces the number of required compaction passes.

The system displays and evaluates rigidity data of the compacted material in real time and displays the increase in compaction. All required information about compacting works, e.g. current stiffness of the compacted layer or current speed of the machine, are displayed on the main operator display in the cab of the operator.



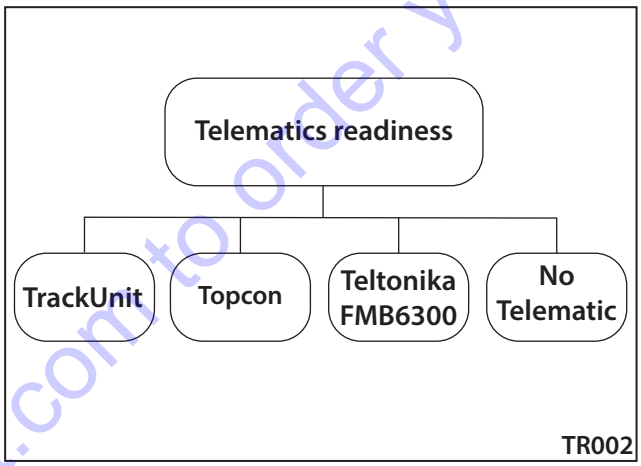
1.4.6 Telematic Readiness

Global positioning system with telemetry that monitors operating systems of the machine (machine start, diesel engine speed, machine consumption, number of engine hours, etc.) ant its current position.

The GPS system allows the geofencing function (machine operation limited to a defined area) and remote machine monitoring which helps finding a stolen machine.

Note

The availability and content of the given data depends on the selected manufacturer of the telematics system.



1.4.7 Fire extinguisher

The fire extinguisher is a fire protection tool and is used to smother fire in an early stage of development. The powder is not electrically conductive so it can be used to extinguish live electrical equipment.

Note

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

1.4.8 Tachograph

The tachograph is a device that records machine operation data. Control duration, passed distance and machine speed data is recorded in the memory of the device. The data is written on the driver's card.

1.4.9 ACE Pro

The Ammann Compaction Expert ACE is a measuring system for vibrating rollers. This world-unique control system allows smooth and automatic adjustment of amplitude and frequency depending on the selected preset and soil conditions.

Measured values (e.g. stiffness, temperature) and other important process information, e.g. optimum travel speed, frequency and amplitude, are continuously shown on the display to achieve the best compaction results.

2 OPERATING MANUAL

ARS 110
(Deutz Tier 4 Final)

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 drivers and maintenance workers that include requirements for safety of operation when the machine is used.
- 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.

  The contractor must make the machine driver carrying out the earth works familiar with the above items.
- He must specify a technological procedure including a working process for the performance of 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 drivers provably familiar with the technological procedures.

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.

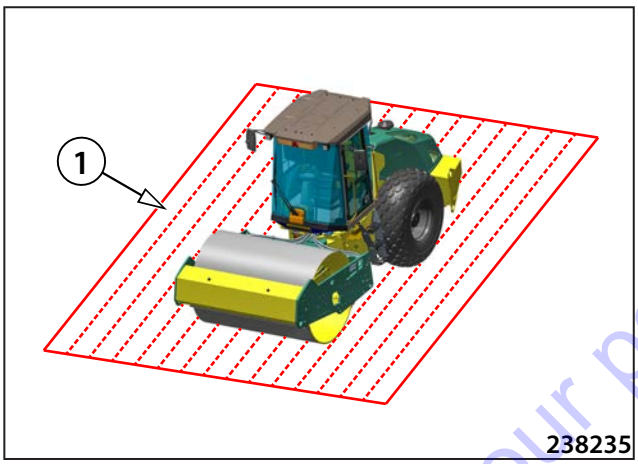
2.1.1.3 Danger zone of the machine and safe distance

Danger zone of a stationary machine:

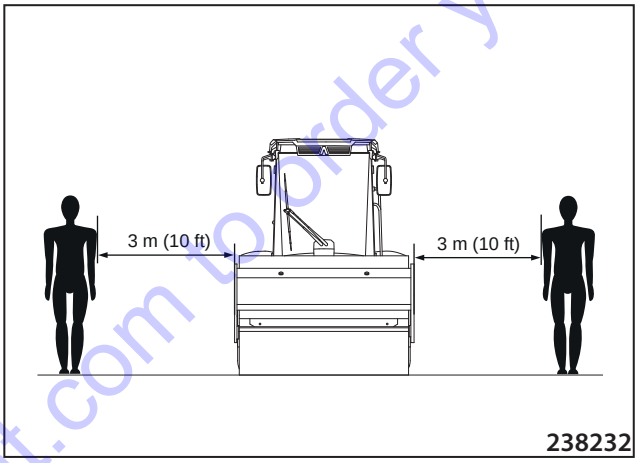
The danger zone of a stationary machine (1) with the engine off or running may only be entered for the purpose of maintenance work and cleaning of the machine, provided that the following conditions are met:

If the machine is stationary and secured against spontaneous movement,

Entry is allowed only to professionally qualified, instructed and trained personnel intended for the operation and maintenance of the machine.



All workers on the jobsite, in the vicinity of the machine but not directly operating or maintaining the machine, must keep a safe distance from the machine and not enter the danger zone of a stationary machine with the engine switched off or running.



The danger zone of a stationary machine with the engine switched off or running is at a distance of 3 m from a stationary machine on the left and right side of the machine and 15 m in front and rear of the direction of travel of the machine!

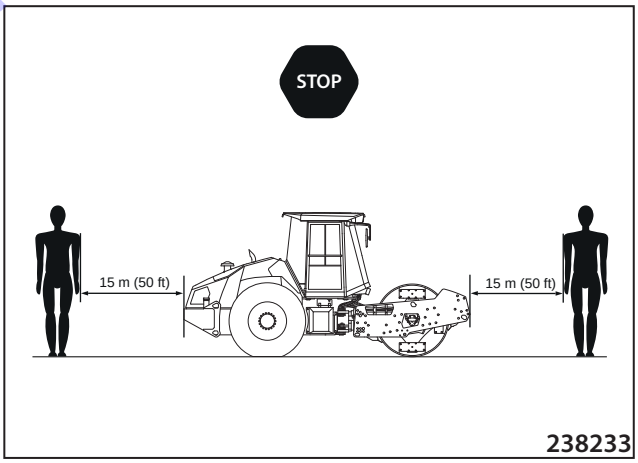
Only professionally qualified, instructed and trained personnel designated to operate and maintain the machine may enter the danger zone of the machine!

The machine owner and the machine operator must ensure that all workers on the jobsite comply with the prohibition of entry into the danger zone of the machine!

The machine owner and the machine operator must ensure that, in areas where it is not possible to observe the specified safe distances, supervision is provided by another person or even several persons who will oversee the movement of surrounding persons and the movement of the machine! These persons must be in contact with the machine operator by means of a communication device or by means of the designated signals according to Chapter 2.1.6. Hand signals.

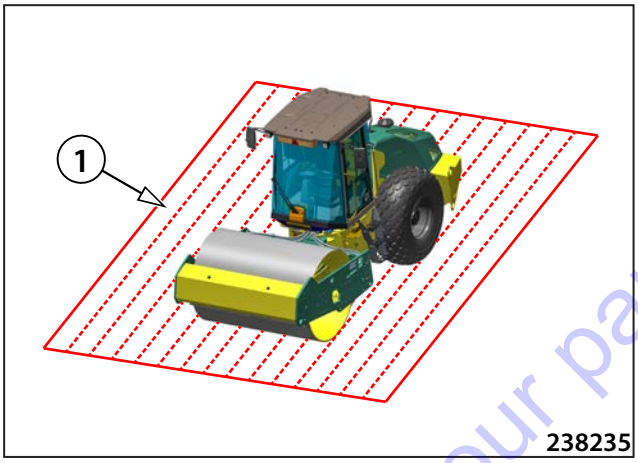
These requirements during machine operation are considered mandatory with regard to the safety of persons!

AMMANN assumes no responsibility if the machine is operated incorrectly or is used incorrectly in operating modes, which may result in personal injury or death, damage to the machine or property!

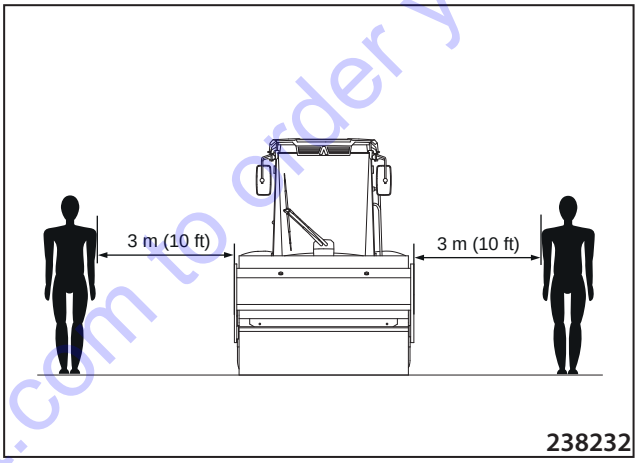


Danger zone of a moving machine:

No persons may be present in the danger zone of the machine (1) when the machine is in motion.



All workers on the jobsite near the machine but not directly operating the machine must keep a safe distance from the machine and not enter the machine's danger zone while the machine is in motion.



The machine's danger zone is at a distance of 3 m from a moving machine on the left and right side of the machine and 25 m in front and rear of the direction of travel of the machine!

No persons may be present in the danger zone of the machine when the machine is moving!

The machine owner and the machine operator must ensure that all workers on the jobsite comply with the prohibition of entry into the danger zone of the machine!

The machine owner and the machine operator must ensure that, in areas where it is not possible to observe the specified safe distances, supervision is provided by another person or even several persons who will oversee the movement of surrounding persons and the movement of the machine! These persons must be in contact with the machine operator by means of a communication device or by means of the designated signals according to Chapter 2.1.6. Hand signals.

These requirements during machine operation are considered mandatory with regard to the safety of persons!

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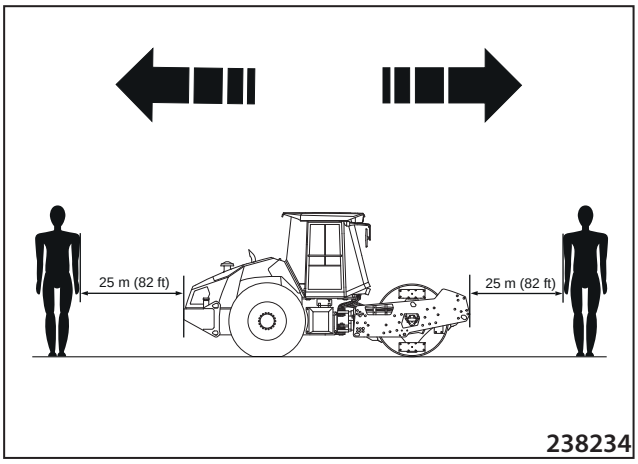
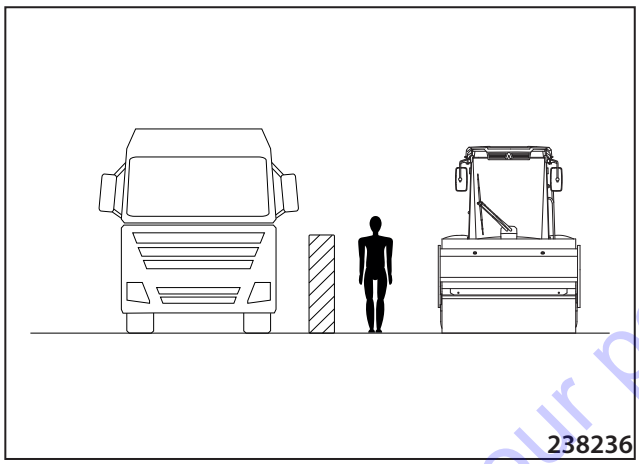


Safe distance between a public road and the construction site:

The safe distance between a public road and the construction site must be defined by a visible barrier against unauthorized entry into the construction site.



The safe distance between a public road and the construction site shall be determined by the machine operator on the basis of the relevant national regulations.

The machine owner and operator must ensure a safe distance between the public road and the jobsite area!

AMMANN assumes no responsibility if the machine is operated incorrectly or is used incorrectly in operating modes, which may result in personal injury or death, damage to the machine or property!

2.1.1.4 Ensurance of safety measures by the provider

- The provider must ensure that the machine is operated only in such conditions and only for such purposes, for which the machine is technically capable according to conditions specified by the manufacturer and in relevant standards.
- He must ensure that the roller is used only in such a manner and in such workplaces where there is no danger of 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.
- The person (driver) who drives the machine and each person carrying out maintenance works and repairs of the machine must be familiarized with instructions specified in the Operation manual.
- He must ensure that the "Operation manual" and the operation book are kept on a specified place to be at disposal for the driver all the time.
- 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 (such as fuel, oils, coolant, brake fluid, etc.) must be removed from places of leakage according to their nature to avoid their adverse impact on the environment, safety of operation and health of people.

2.1.1.5 Cab with integrated ROPS

- The ROPS cab must not be deformed and must not show signs of corrosion, cracks or breaks. It must be fixedly connected to the machine frame. No additional modifications of the cab may be performed without approval of the manufacturer because such modifications can reduce its strength. The screwed connections must comply with the specification and must be tightened to the specified torque, must be neither damaged nor deformed, and must not show signs of corrosion.

2.1.2 Requirements for the machine driver's qualification

- Only a driver having been trained according to ISO 7130 and other local and national instructions and standards specified for drivers of such a group of machines is allowed to operate the roller.
- Only the one who learns to drive the machine with the approval of the user for the purpose of getting preliminary practice may drive the machine with no licence, and such a person has to be under direct and continuous surveillance of a professional teacher or trainer.
- The licence (certificate) holder is obliged to take due care of the licence and when requested to submit it to the control authorities.
- The licence holder must not make any records, changes or corrections in the licence card.
- He is obliged to immediately report his lost licence to the authority that issued the licence.
- The roller may be driven without a respective licence independently and for a short term only by a worker who is mentally and physically fit, over 18 years old and is:

  a) charged by the machine manufacturer with assembling, testing and presenting the machine and possibly with training the drivers whereas he must be familiar with work safety regulations in force at the workplace

  or

  b) assigned by the building works contractor for operation (maintenance), trained and practised in a provable manner and/or having the professional qualification to operate and drive the roller in compliance with special provisions (machine operator licence, etc.).
- The machine driver must undergo training and examination concerning the work safety regulations at least once every 2 years.

2.1.3 Driver's obligations

- Before starting operation of the machine, the driver 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 the personnel in charge of maintenance, adjustments and repairs of the machine. (If you do not understand some parts of the manuals, contact the nearest dealer or the manufacturer.)
- The driver must not drive a roller, unless he is fully familiarized with all functions of the machine, working and operating elements and unless he precisely knows how to operate the machine.
- The driver is obliged to follow the safety symbols placed on the machine and keep them legible.
- Before starting the work, the driver must get familiar with the workplace environment, i.e. with obstructions, slopes, utility line system and necessary types of workplace protections with respect to the surroundings (noise, vibration, etc.).
- When the driver finds out any hazard to health or life of persons, property hazard, failure, accident of the technological equipment, or when he finds out any symptoms of such hazards during operation, then the driver, unless is able to eliminate such hazards by himself, must stop the work and secure the machine against undesirable starting and attach the warning sign "MACHINE REPAIR" on the steering wheel as shown in the chapter "Safety notices and signs used on the machine", report this to the person in charge and if possible notify all persons exposed to such a danger.
- Before starting operation of the machine, the driver is obliged to get familiar with records and operational deviations found during the previous work shift.
- Before starting the work, he must inspect the machine, accessories, check up control elements, communication and safety devices, whether they are operable according to the manual. If he finds a defect that might endanger the safety of work and is not able to repair it, he must not put the machine into operation and must report the defect to the responsible worker.
- The driver while working with the machine must be fastened with the safety belt.
- The safety belt and its brackets must not be damaged.
- If the driver finds a defect during operation, he must immediately stop the machine and secure it safely against undesirable starting.
- During operation the driver must watch operation of the machine and record any detected defects into the operation book.
- The driver must maintain the operational book, which is defined for records on the machine acceptance and take-over carried out between drivers, for defects and repairs done during operation and keeping the serious events during the working shift on files.
- Before the engine is put into operation, the controls must be in the parking brake position; 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.
- Before putting the machine into operation, he must check the brakes and steering for functioning.
- After a warning alarm, the operator may put the machine into operation only when all workers have left the endangered area. At not clearly arranged workplaces, the machine can be put into operation not earlier than after expiration of the period of time needed for people to leave 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 safety of work; the driver must be fully engaged in steering the machine. Always sit on the seat while driving the machine.
- The driver must always sit on the seat while driving the machine considering the restrictions imposed by the seat switch.
- 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. Watch continuously the clearance to avoid collision with any obstruction.
- When the machine operation is finished or stopped and the driver leaves the machine, he must take measures against unauthorized use of the machine or against spontaneous starting. Remove the key from the ignition box, lock the cab and disconnect the wiring using the disconnector.
- When the operation is completed, he must 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 operation book. When drivers take turns, the driver is obliged to report any identified facts to the following driver.
- The driver must use personal protective equipment (PPE) – work clothing, safety shoes, The clothing must not be too loose, impaired, hair must be protected with a suitable cap. During maintenance (lubrication, refilling and replacement of working media) the hands must be protected with suitable gloves.
- The driver must use suitable ear protection when using the machine without cab or with open windows.
- He must keep accessories of the machine as prescribed.
- He must keep the driver's stand, foot rests and walkway surfaces clean.
- Before lifting off the cab and the bonnet, check that there is a sufficient space needed for lifting and that there are no electrical circuits there. Before lowering the cab and the bonnet, he must check that nobody is endangered by this activity.
- 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 driver's stand,
  - warn the others to keep off and not touch the machine.
- He must keep the machine free of oil contaminants and inflammable materials.

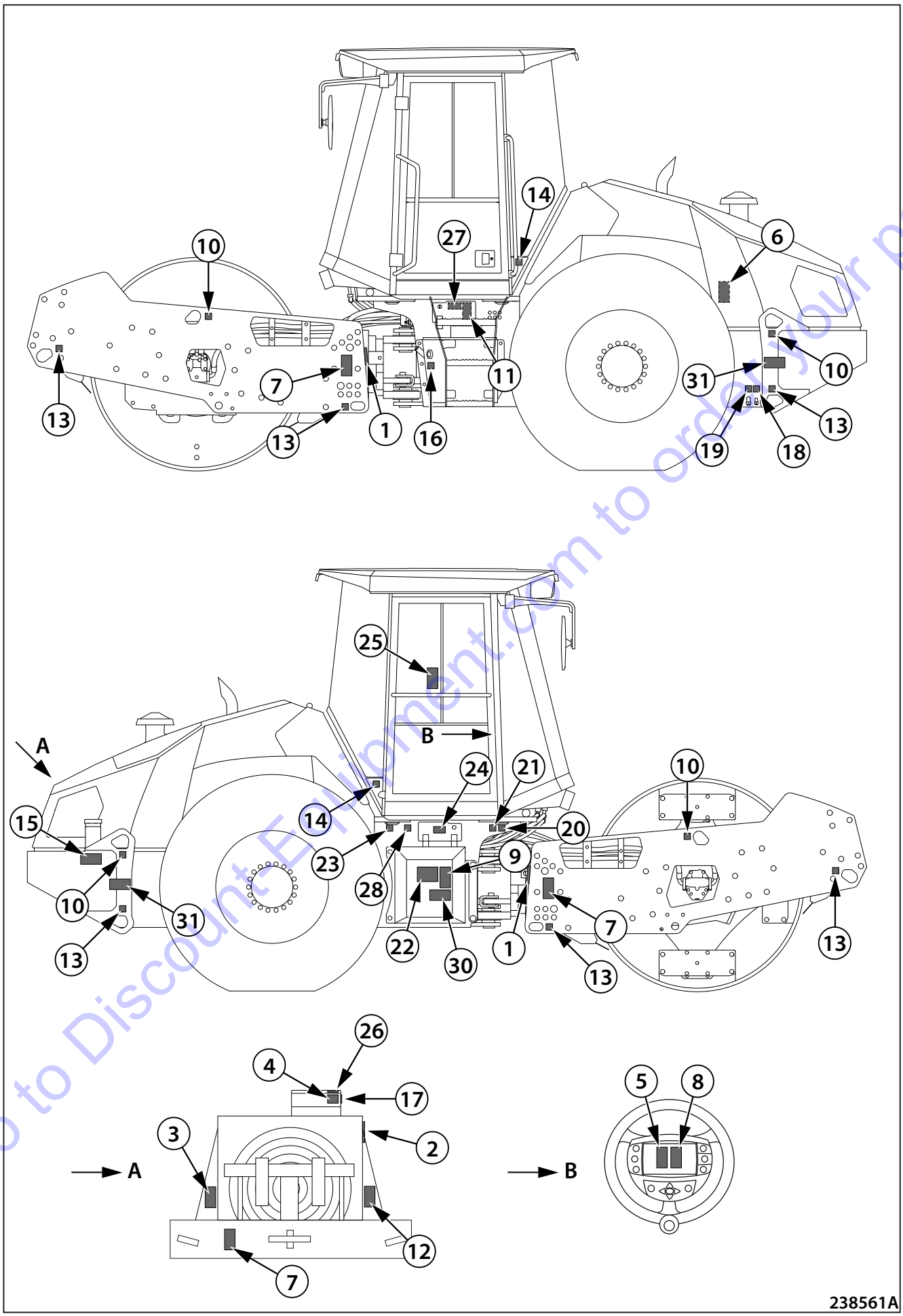
2.1.4 Forbidden activities – safety and guarantee

The following is forbidden

- Increasing and decreasing the engine speed rapidly; you could damage the engine.
- Vibrating on the spot. When it is vibrated on the spot, bearings of the vibrator are not lubricated.
- Filling the hydraulic circuit during the guarantee period in a different way than using the hydraulic unit.
- Changing the vibration amplitude when driving – it is always necessary to stop and only then set a different amplitude.
- Using the emergency brake for turning off the engine during normal operation of the machine.
- U sing the service switch for stopping the machine.
- Using the machine in case of an evident defect of the machine.
- Using the machine when any of the operating fluid levels is low.
- Repairing the engine without authorization – Except common changes of operating fluids and filters, only the Deutz service department is allowed to intervene in the engine, including the peripheral components of the engine – the alternator, starter, thermostat, electrical installation of the engine.
- 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 training of a driver by an instructor.
- Putting the machine into operation and using the machine when a safety device (emergency brake, hydraulic locks, seat switch, 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 operation 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.
- Travelling with vibration on a hard (frozen, concrete, overcompacted) surface or on a bedrock. There is a risk of damaging the machine.
- 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 driver´s stand is not properly attached.
- Working with the machine when the bonnet 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 driver's stand and where hazard to people or property could occur unless the work safety is ensured through some other way, e.g. with mediate signalling by a duly instructed 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 driver when the machine is running and the service switch and parking brake are not enabled.
- 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 the oil, fuel, coolant or other operating fluid is leaking.
- Starting the engine in a different way than it is given in the operation manual.
- Placing other items (tools, accessories) than items for personal use in the driver'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 an open fire when checking or pumping fuels, replacing and refilling oils, lubricating the machine and inspecting the battery and refilling the battery.
- Carrying rags soaked with flammable materials or flammable liquids in free vessels on the machine (in the engine compartment, cab).
- Leave the engine running in enclosed, unventilated areas. Exhaust fumes are dangerous to life.

- Travelling with open doors.
- Making 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.
- Operating the machine without external rear view mirrors.

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



2.1.5 Safety notices and signs applied on the machine

1. Squeezing hazard


2941bz

Keep a safe distance from the machine, there is a danger of squeezing by the machine between the front and rear frame.

2. Risk of burns


2586bz

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

3. Risk of injury


2409bz

There is a risk of injury. Do not touch rotating parts while the engine is running.

4. Risk of injury


3227bz

There is a risk of scalding. Do not open the cap until the fluid cools down below 50 °C (122 °F).

5. Read the Operating manual


2702bz

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

6. Risk of injury


2601bz

There is a risk of injury. Do not touch rotating parts while the engine is running.

7. Danger zone


2942bz

Keep a safe distance from the machine.

8. Safety belt

Fasten the safety belt before the machine starts moving.

9. Risk of explosion

There is a risk of explosion when the battery is handled. Read the operation manual!

10. Lifting point

Only use these points to lift the machine.

11. Welding on machine

Prior to any welding operations, disconnect the battery, alternator, control units and other electronic components of the machine. Read the operation manual!

12. Washing the machine with water

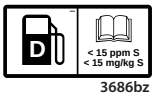
Hazardous situation. Prevent water from entering electric and electronic parts of the machine as it may result in damage of the equipment and personal injury. Read the operation manual!

13. Tie-down attachment point

Tie-down the machine for transport at these points only.

14. Tyre pressure

15. Refuelling



16. Hydraulic oil level

17. Coolant

2152bz

The coolant is harmful to health. Read the operation manual!

18. Coolant drain plug

3189bz

19. Engine oil drain plug

3692bz

20. Machine max height

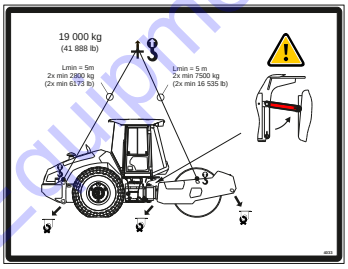
4034bz

Attention when passing through places with height limits.

21. Guaranteed sound power level

3204bz

22. Lifting diagram



4033bz

To lift the machine, use binding means of sufficient loading capacity, refer to the chapter Machine loading. Before lifting, lock the articulation of the machine.

23. Measuring points

4050bz

reverse travel / forward travel / vibration I / vibration II / steering / filling pump pressure

24. Measuring points

position	funkce / Function / Funktion	max. tlak / press / Druck	rozsah měření mesure extent messbereich
1	vibrace I / vibration I / vibration I	42 MPa (6090 PSI)	0-60 MPa (0-10000 PSI)
2	řízení / steering / lenkung	23 MPa (3335 PSI)	0-25 MPa (0- 4166 PSI)
3	jízda vzad / forward travel / Fahrt nach vorne	42 MPa (6090 PSI)	0-60 MPa (0-10000 PSI)
4	vibrace II / vibration II / vibration II	42 MPa (6090 PSI)	0-60 MPa (0-10000 PSI)
5	tlak plnicího čerpadla / pressure of the feed pump Druck von der Füllpumpe	2,2 MPa (319 PSI)	0-4 MPa (0-666 PSI)
6	jízda vpřed / reverse travel / Rückfahrt	42 MPa (6090 PSI)	0-60 MPa (0-10000 PSI)

4029bz

When measuring pressures, use the table. The table contains pressures in the defined measuring points and recommended ranges of measuring instruments.

25. Emergency exit

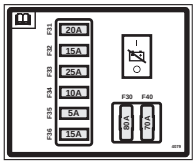
2884bz

Unless possible to exit the Machine via LH door, please use emergency exit.

26. Expansion tank filling

3691bz

27. Battery switch



4079bz

28. Ear protectors

2408bz

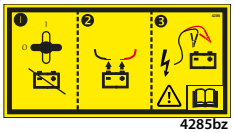
Use ear muffs when the Machine has no cab or you work with open windows.

29. Risk of injury

3553bz

Before switching off the engine, lower the blade to the ground.

30. Charging of the battery



4285bz

Risk of electric shock! Charge the battery according to the operating manual!

31. Ballasted tyres

4307bz

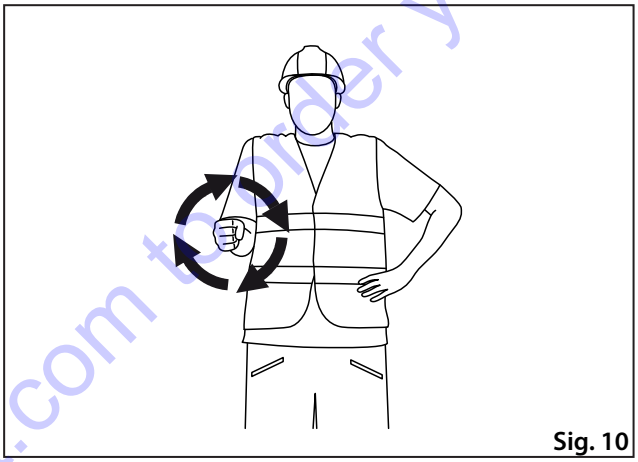
The tyres of the machine are ballasted with liquid. The label is only attached to machines with ballasted tyres. Read the operating manual!

2.1.6 Manual 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.

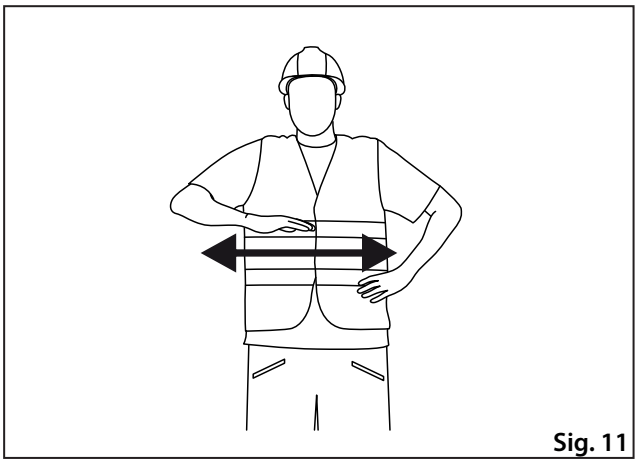
Examples of communication signals:

Engine start



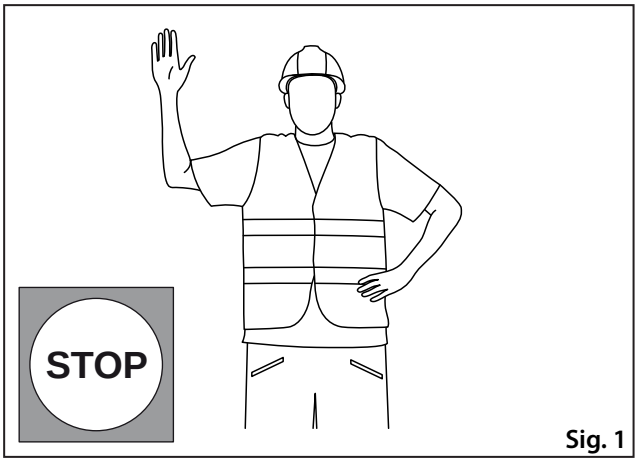
Sig. 10

Engine OFF



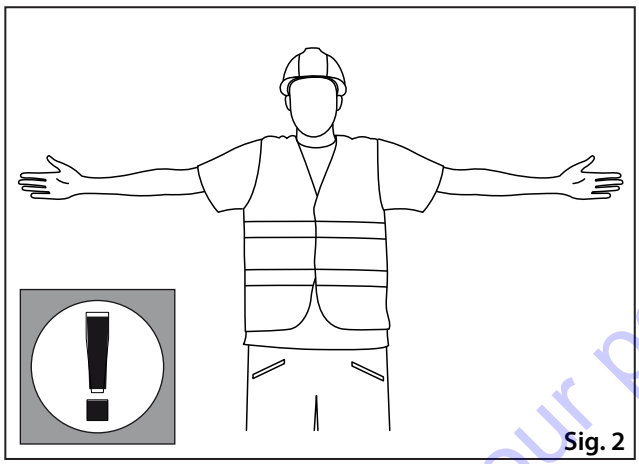
Sig. 11

Stop



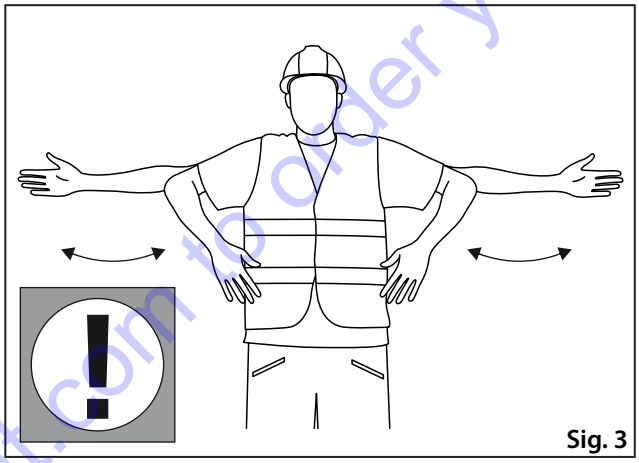
Sig. 1

Watch out



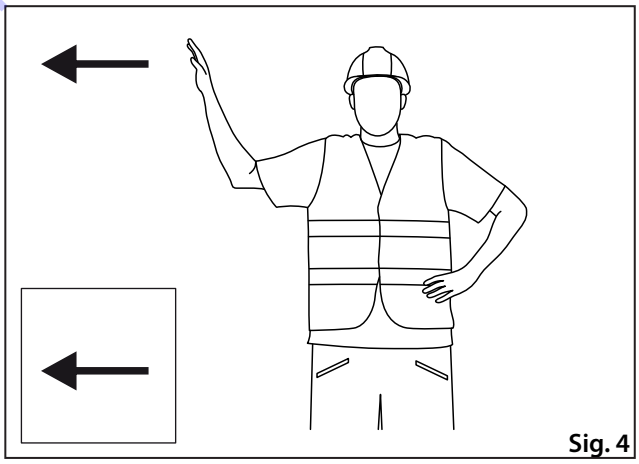
Sig. 2

Watch out, danger



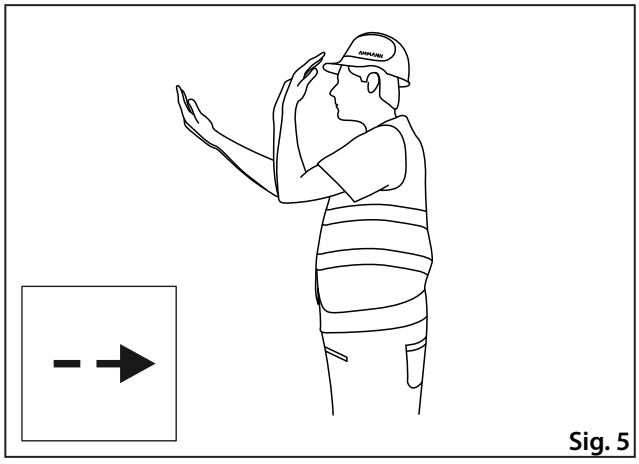
Sig. 3

Travel



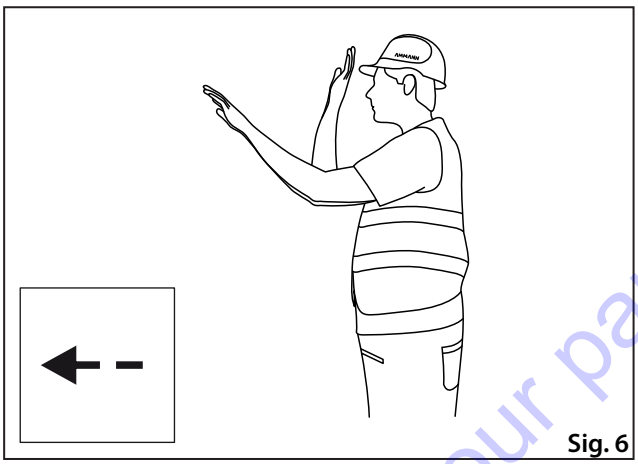
Sig. 4

Slow forward drive – towards me



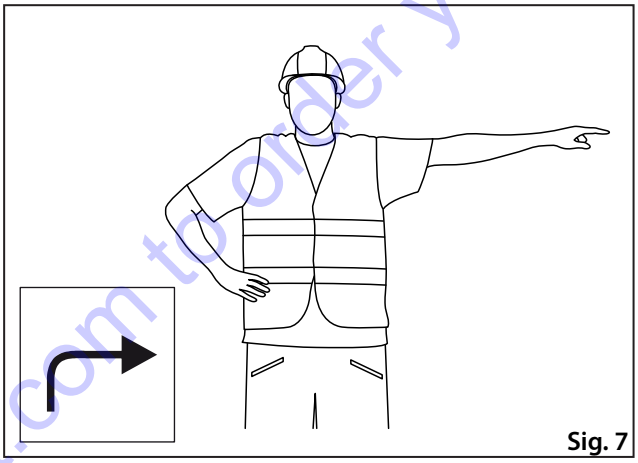
Sig. 5

Slow backward drive – away from me



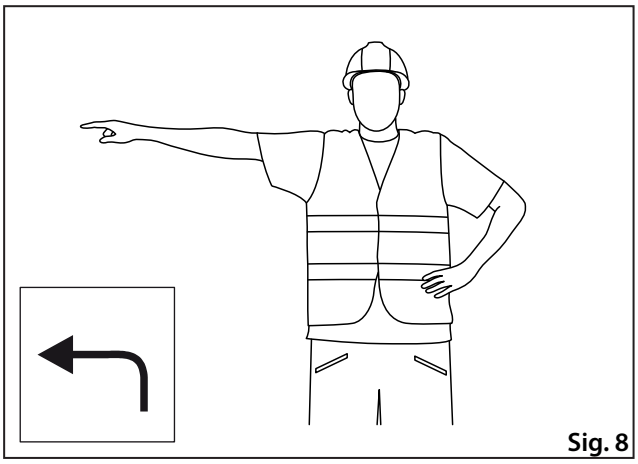
Sig. 6

Drive to the right



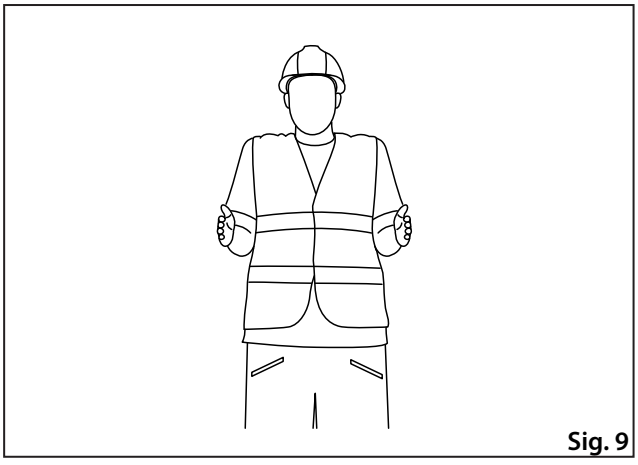
Sig. 7

Drive to the left



Sig. 8

Short distance travel



Sig. 9

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 and being in force within the territory where the machine is used.

2.2.1 Hygiene principles

- Petroleum products, cooling system fluids, battery cartridges 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 Operating manual 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, oil or fuels,
  - coolants,
  - battery cartridges and batteries,
  - tyre fillings,
  - cleaning and preservative agents,
  - all dismounted filters and filter elements,
  - all used and discarded hydraulic or fuel hoses, rubber-metals and other parts of the machine contaminated by the above mentioned products.

- Producer and contractual service organizations accredited by him, or dealers take back the following materials or parts free of charge:

  - oils,
  - batteries,
  - tyres.

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 individual parts of the environment and in compliance with health protection regulations.

2.3 Preservation and storage of the machine

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 lubricating points, cable hoses, joints of the controls, etc..
- Check that water fluids 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.

If you treat the machine as above described, it is not necessary to prepare the machine in a special manner before it is put into operation again.

2.3.2 Preservation and storage 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 (recharge the batteries regularly).
- Support the drum frame so that the shock-absorbing system shows a minimum sag.
- Protect the rubber elements by coating with special preservative agent.
- Inflate the tyres to the prescribed pressure and protect them before sunlight.
- Lubricate chromed surfaces of piston rods with preservative grease.
- Preserve the machine by spraying a special liquid, in particular in places with risk of corrosion.
- 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 them into 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.

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!

Never start the engine during storage!

2.3.3 Depreservation and inspection of the delivered machine

Check the machine according to transport documents.

Check all parts of the machine for damage during transport and for missing parts. Inform the shipper of any discrepancies.

Before putting the machine into operation, wash the preservation agents away using high pressure stream of hot water with common degreasers while observing environmental principles.

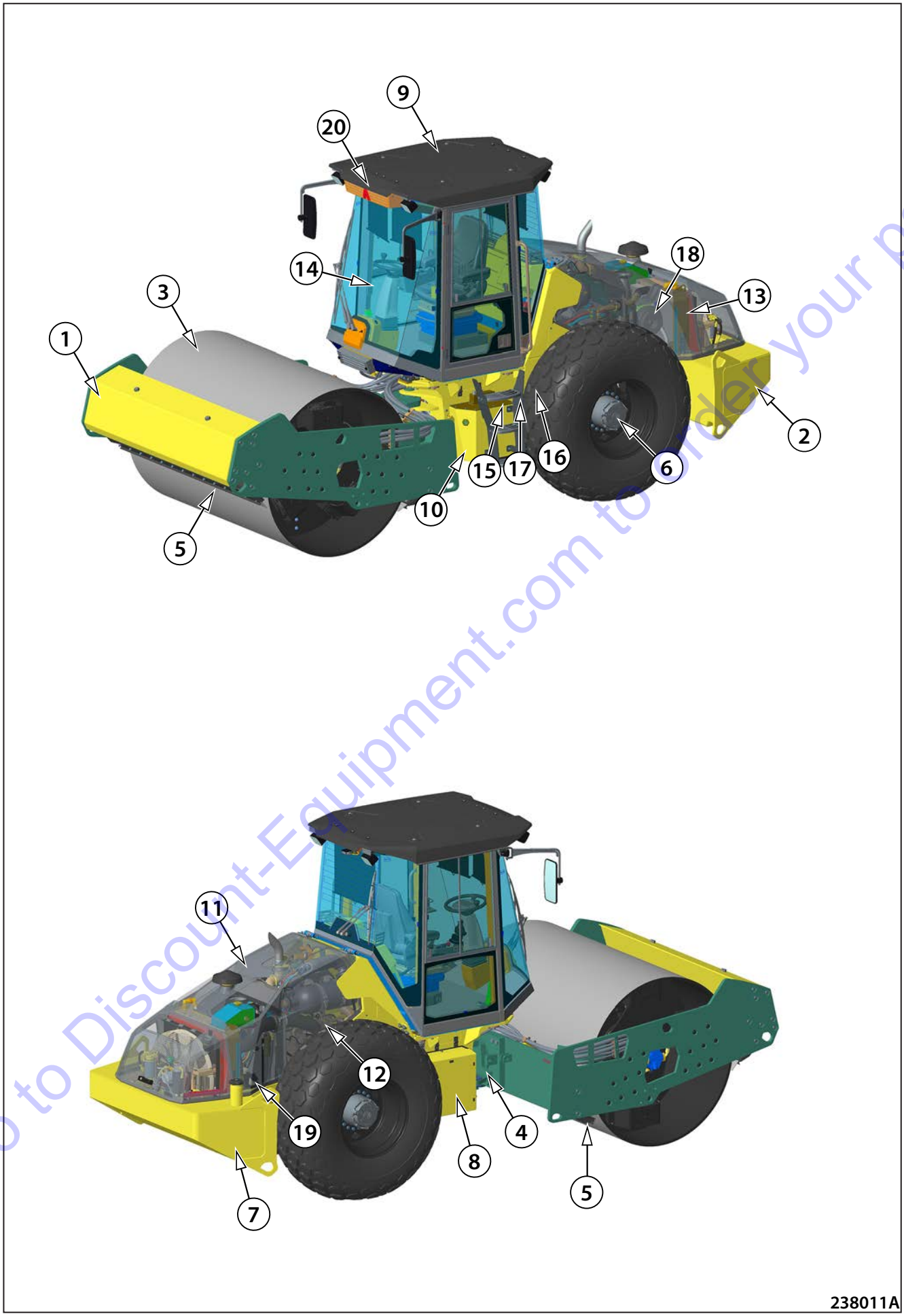
Remove the preservative agents and wash the machine in places provided with intercepting sumps to trap the rinsing water as well as de-preservative agents.

2.4 Machine disposal after its service life

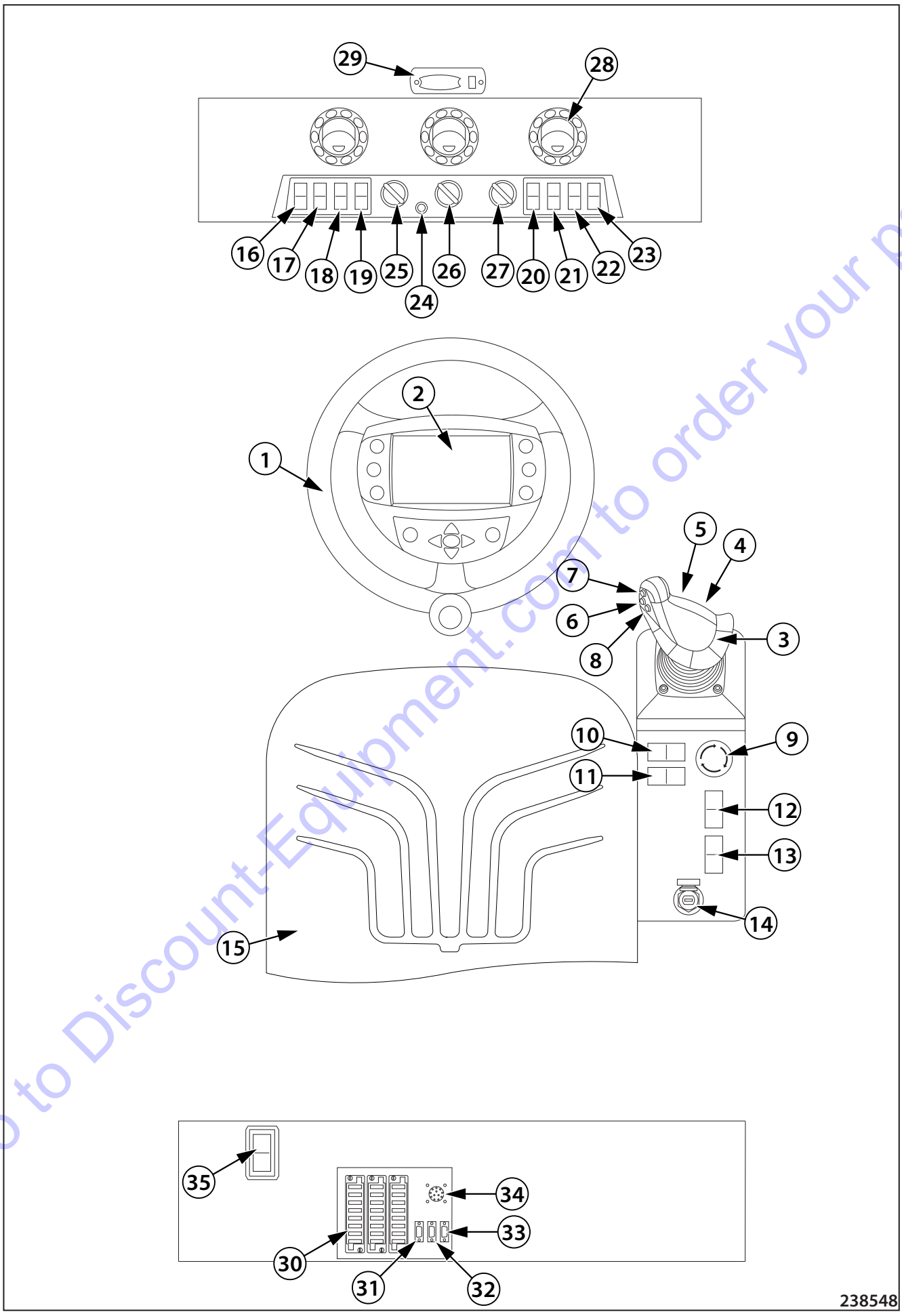
When disposing the machine following its service life, the user is obliged to follow national waste and environmental regulations and acts. In the above cases, we recommend you to always contact:

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

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



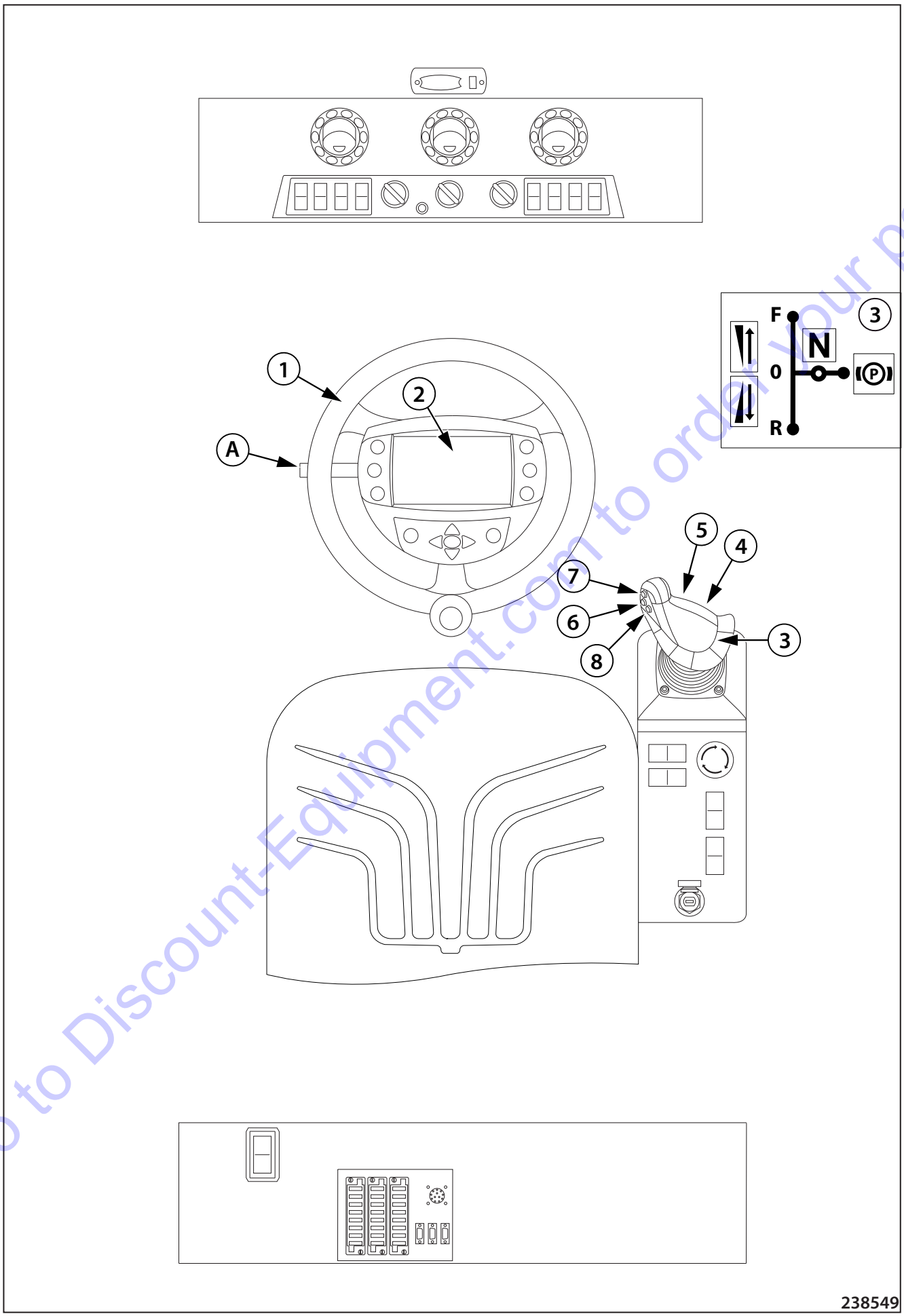
1. Drum frame
2. Tractor frame
3. Vibratory drum
4. Joint
5. Scrapers
6. Axle
7. Fuel tank
8. Batteries
9. Cab
10. Hydraulic tank
11. Bonnet
12. Engine
13. Combined cooler
14. Driver's stand
15. Steering hydraulic generator
16. Travel hydraulic generator
17. Vibration hydraulic generator
18. Air filter
19. DEF tank (AdBlue)
20. Air-conditioning



Dashboard and control panels

1. Steering wheel
2. Display
3. Travel controller
4. Blade down button (optional)*
5. Blade up button (optional)*
6. Vibration button
7. Speed gear increase button
8. Speed gear decrease button
9. Emergency brake button
10. Warning horn button
11. Turn signal light switch
12. Vibration amplitude selector switch
13. Vibration mode selector switch
14. Ignition box
15. Operator seat
16. Rear window heating switch
17. Windscreen washer switch
18. Rear screen wiper switch
19. Front screen wiper switch
20. Additional lights switch
21. Road lights switch (optional)
22. Warning lights switch
23. Warning beacon switch (optional)
24. Air-conditioning switch (optional)
25. Air-conditioning fan speed switch (optional)
26. Heating temperature control
27. Heater fan speed switch
28. Air-conditioning outlets
29. Cab light
30. Fuse box
31. CAN 3 connector (ACE)
32. CAN 1 connector (Diagnostics)
33. CAN 2 connector
34. Engine diagnostics
35. Service switch

* Press the buttons (4) and (5) at the same time to enable the floating position of the blade.

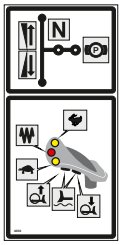


Steering wheel (1)

Lever A – Column tilting forward/backward

Display (2)

Multifunction instrument to display parameters of the engine and machine functions.



4036bz

Travel control (3)

The travel control is used for braking the machine and setting the direction and speed of travel.

Travel control positions:

P Parking brake – parking brake of the machine enabled.

N neutral – the machine is not braked, the function avoiding the downhill driving is enabled, the engine idle speed is set.

0 zero position – the machine is not braked, the function avoiding the downhill driving is disabled, the engine working speed is set.

F Forward travel

R Reverse travel

The machine braking is indicated by lighting up the brake indicator lamp on the display (2).

The travel speed corresponds to the combination of the speed gear selected by the buttons (7) and (8) and moving the travel control (3) from the zero position.

AMN402

Blade button – down (4)

Use the button to adjust the blade to the working position.

AMN403

Blade button – up (5)

Use the button to adjust the blade to the transport position.

AMN404

Blade floating position button (4, 5)

Press the buttons (4) and (5) at the same time to enable the floating position of the blade.

2612

Vibration button (6)

Press the button to turn on/off the function.

The function is displayed on the display (2).

You cannot start the vibration while driving at the transport speed (4th speed gear – HX, 5th speed gear – D).

When it is vibrated on the spot, the vibration will be switched off after 30 seconds automatically. For restarting the vibration, it is necessary to drive the machine by 8 metres.

AMN467

Speed gear increase button (7)

Press the button to engage the upper speed gear.

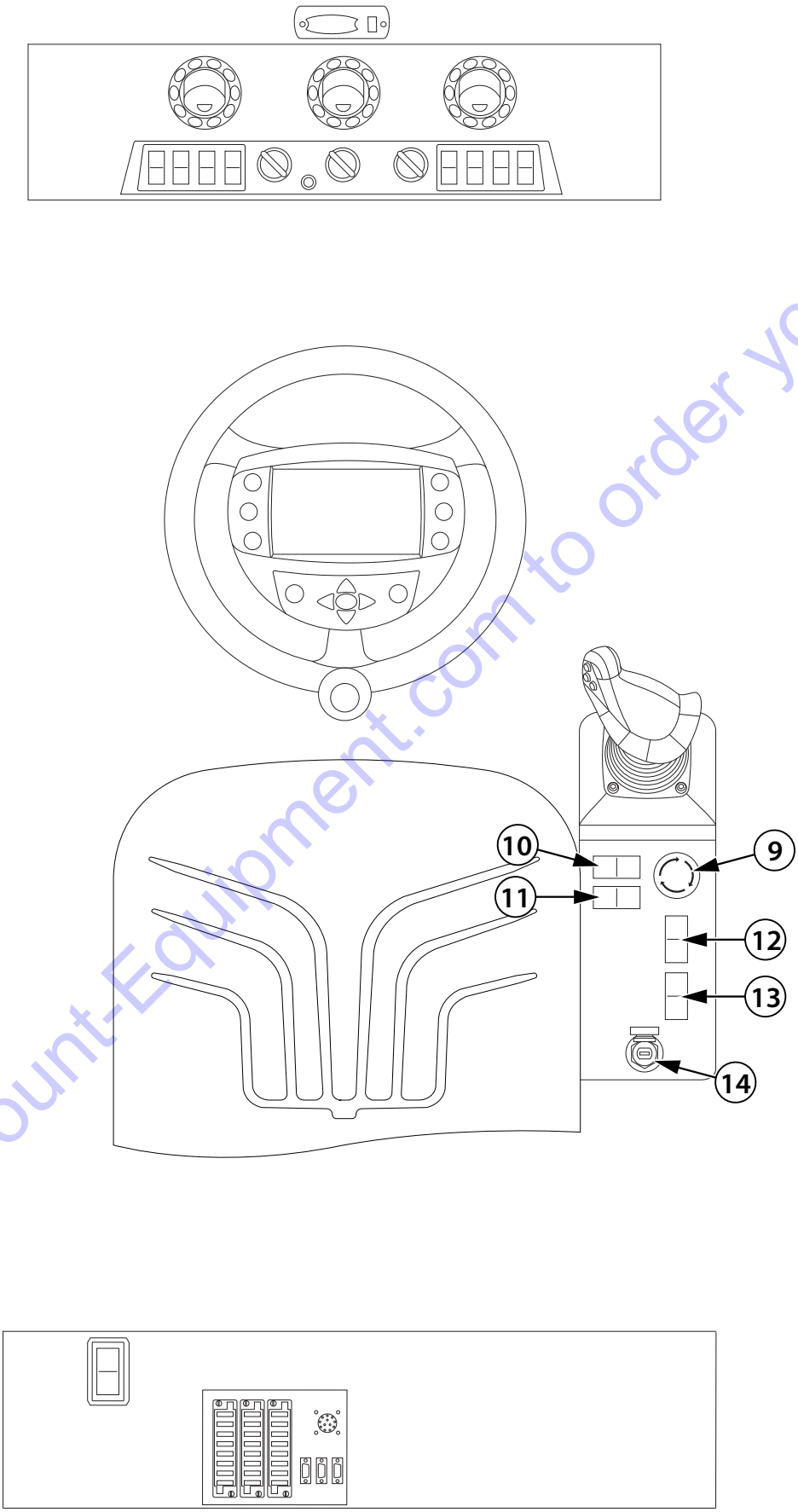
AMN468

Speed gear decrease button (8)

Press the button to engage the lower speed gear.

Do not exceed the 30-minute time limit while driving at the transport speed (speed gear 5). Risk of overheating of machine parts!

The speed gear 0 is adjusted as starting after 15 minutes after the switch box is turned off.



238550

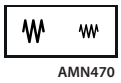
Emergency brake button (9)

Press the button to enable the machine emergency brake, which is indicated by lighting up the brake and charging indicator lamps (2).

The machine stops moving, the parking brake is enabled and the engine stalls!

Warning horn switch (10)

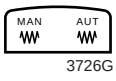
Turn signals switch (11)



Vibration amplitude switch (12)

Up – amplitude I ON

Down – amplitude II ON



Vibration mode selector switch (13)

It is used for turning on the vibration in the MAN or AUT mode.

MAN – manual vibration mode; the vibration can be turned on even when the machine is not moving.

AUT – automatic mode to turn on/off the vibration.

Ignition box (14)

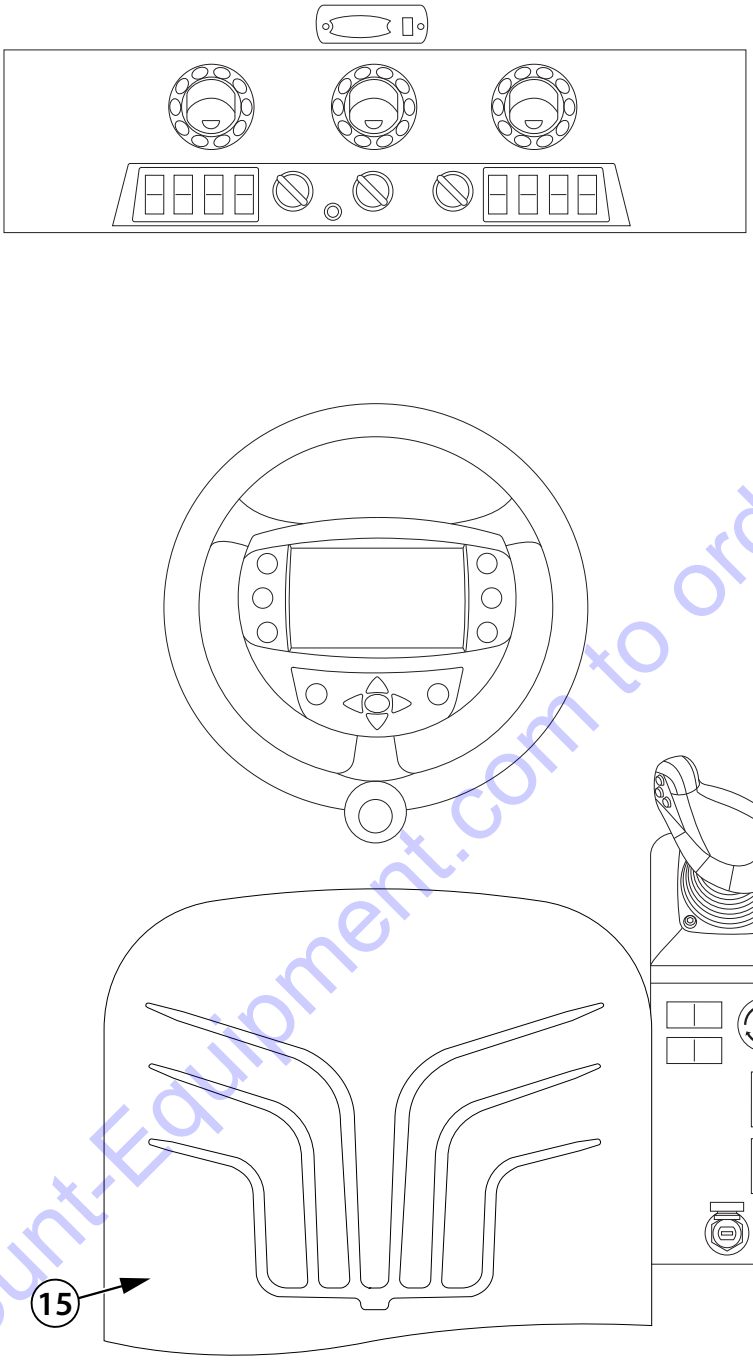
There are three positions "0-I-II" of the ignition box. The key can be inserted and removed in position "0" only.

Turn a bit the key to the right side to enable the position "I" first and then the position "II".

The "I" position is used for connecting instruments.

The position "II" is used for starting the engine.

Protect the ignition box with the protective cover after the key is pulled out.

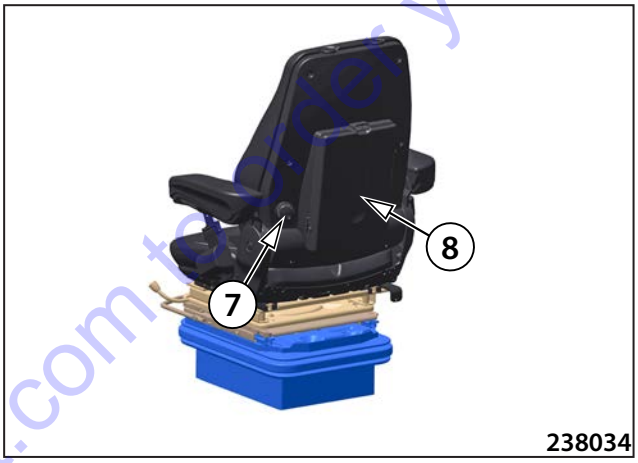


238551

Operator seat (15)

Seat adjustment:

1. Backrest position
2. Seat shifting
3. Seat angle
4. Seat springing stiffness according to weight indicator
5. Longitudinal seat travel
7. Lumbar support control
8. Document box



Adjust the seat before driving the machine!

The driver must be fastened with the seat belt while driving!

Seat switch:

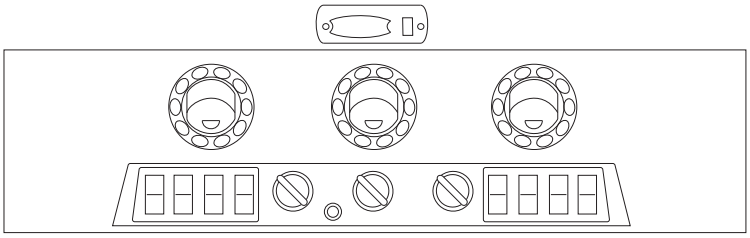
The seat switch is located in the seat cushion.

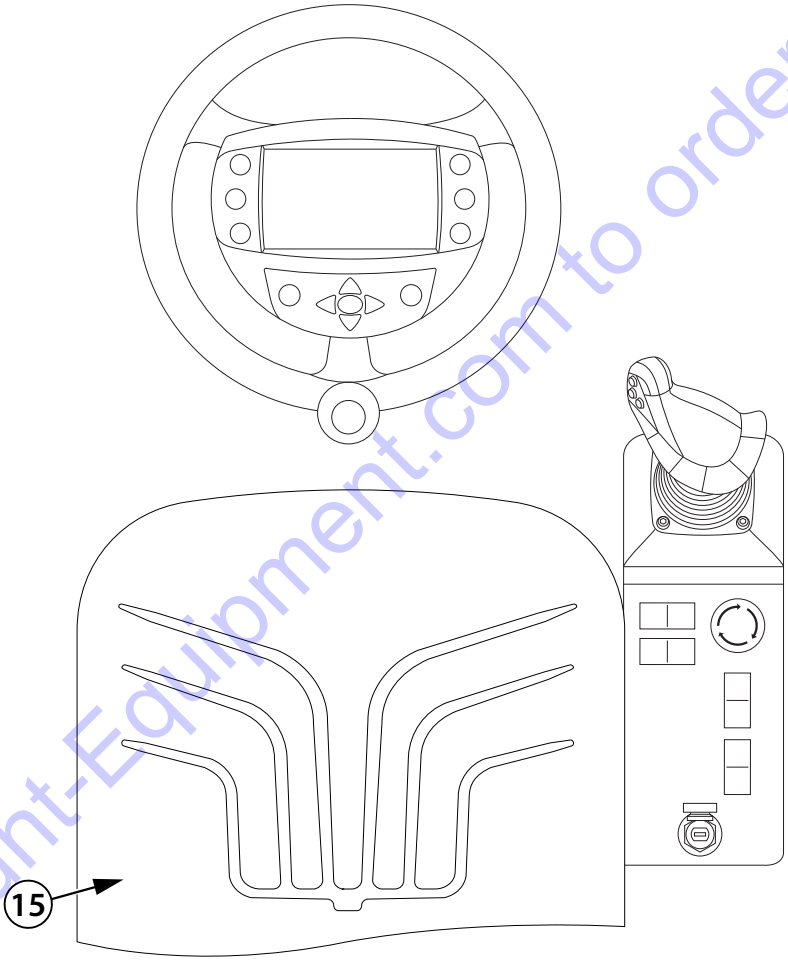
If the driver does not sit on the seat, one of the following limitations occurs – locking the machine moving-off, stopping the machine or turning off the engine.

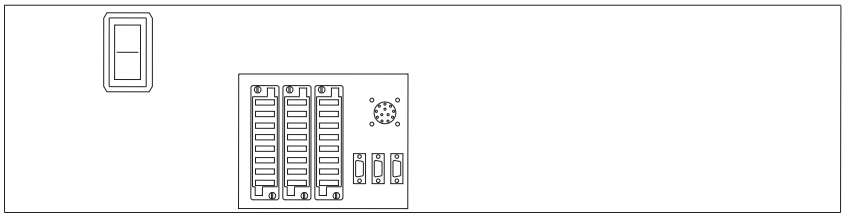
The machine reaction differs depending on the position of the travel control, the seat switch activation (if the operator sits or does not sit on the seat) and the time during which the seat switch is disabled.

Travel control in the parking brake position

- The driver can leave the seat when the engine is running provided that no one moves around the machine and the machine is properly secured against misuse or theft.
- If the driver does not sit on the seat and the travel control is tilted out of the parking brake position, the engine will stop working immediately.
- If servicing or maintenance is performed on the machine, the driver must enable the service switch.







238551

Travel control out of the parking brake position

The machine reaction differs depending on the time during which the driver does not sit on the seat, i.e. 0–5 seconds, 5–10 seconds and 10 or more seconds after the switch is disabled.

- 0–5 seconds after the switch is disabled
  - an icon lights up informing that the switch was disabled and an audible intermittent signal is heard,
  - the machine continues for the first 5 seconds unlimited in the preset mode,
  - the function will be disabled if the driver sits down on the seat within 5 seconds.

- 5–10 seconds after the switch is disabled
  - an orange "Warning" indicator lights up,
  - the machine starts to decrease the speed to a complete stop and the parking brake is enabled regardless of the position of the travel control,
  - to disable the function, switch the seat switch again. To move off the machine, first move the travel control to the brake position and then select the travel direction.

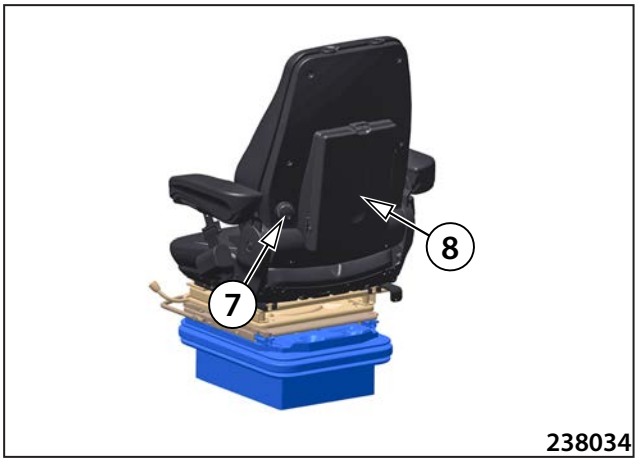
- 10 or more seconds after the switch is disabled
  - a red "Danger " indicator lights up,
  - the engine will stop working 10 seconds after the seat is left,
  - to disable the function, move the travel control to the parking brake position. After turning the key to the "0" position, you can start the engine again.

Do not place any items on the seat switch!

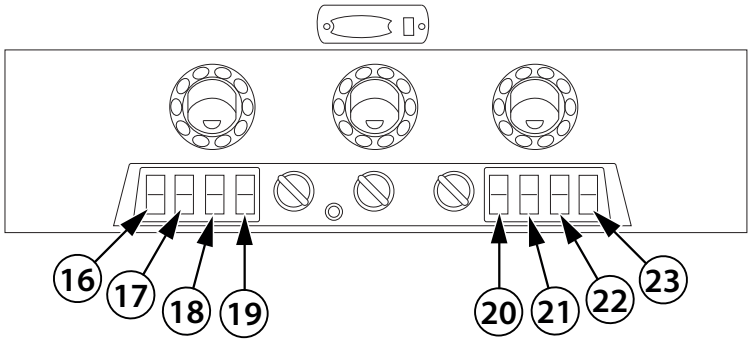
Check regularly the seat switch for correct function.

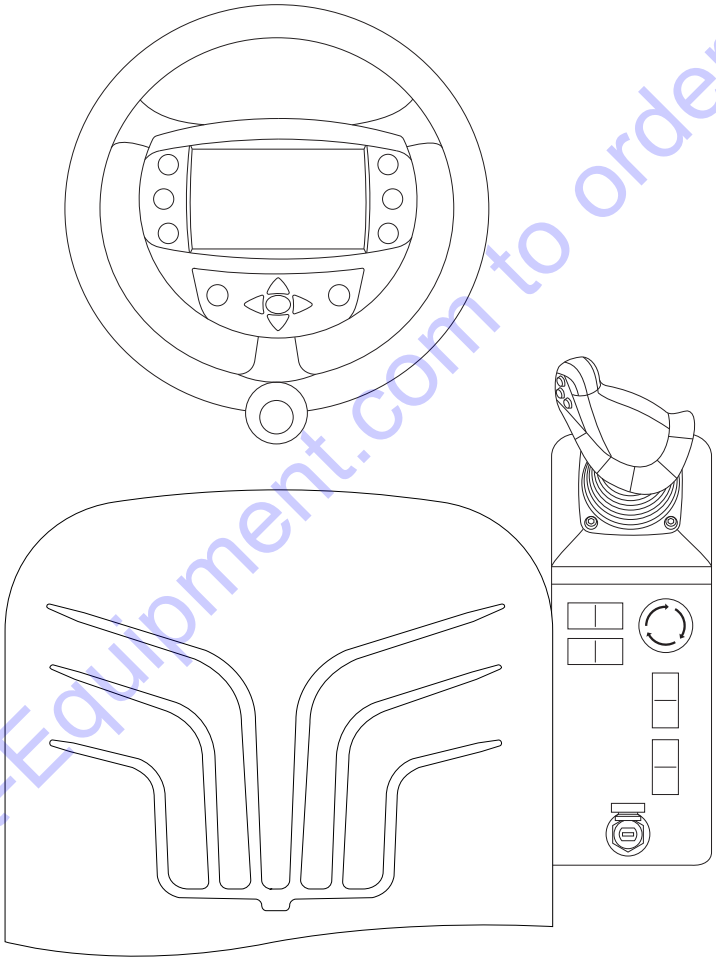
Document box

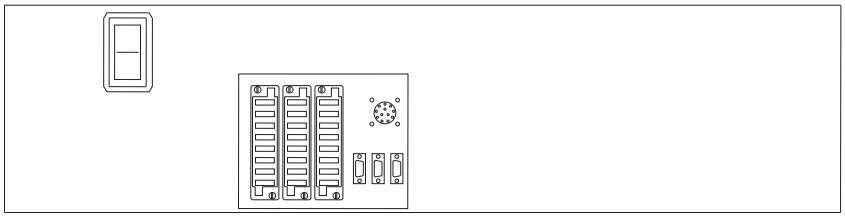
There is a document box on the back side of the seat (8).



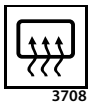
238034







238552


3708

Rear window heating switch (16)

It is used for turning on the rear window heating; the function is indicated by the indicator lamp in the switch.

The heating runs for 5 minutes after the switch is switched on.

- OFF
- ON


2260

Windscreen washer switch (17)

- Front windscreen washing ON
- OFF
- Rear windscreen washing ON

After the windscreen is sprayed, it is wiped twice.


596307

Rear screen wiper switch (18)

- OFF
- Intermittent
- Continuous wiping

The wiping interval of 5 sec. is set automatically by changing the switch from OFF to Intermittent. You can readjust the interval by changing the switch to OFF and then after a required time (from 0.5 to 60 sec.) back to the Intermittent position.


596625

Front screen wiper switch (19)

- OFF
- Intermittent
- Continuous wiping

The wiping interval of 5 sec. is set automatically by changing the switch from OFF to Intermittent. You can readjust the interval by changing the switch to OFF and then after a required time (from 0.5 to 60 sec.) back to the Intermittent position.


AMN450 AMN451

Additional lights switch (20)

It is used for turning on/off the additional lights.

- OFF
- Front lights
- Front and rear lights


AMN449 AMN448

Road lights switch (21)
(optional equipment)

It is used for turning on/off the road lights.

- OFF
- Outline lights
- Dipped lights


2489

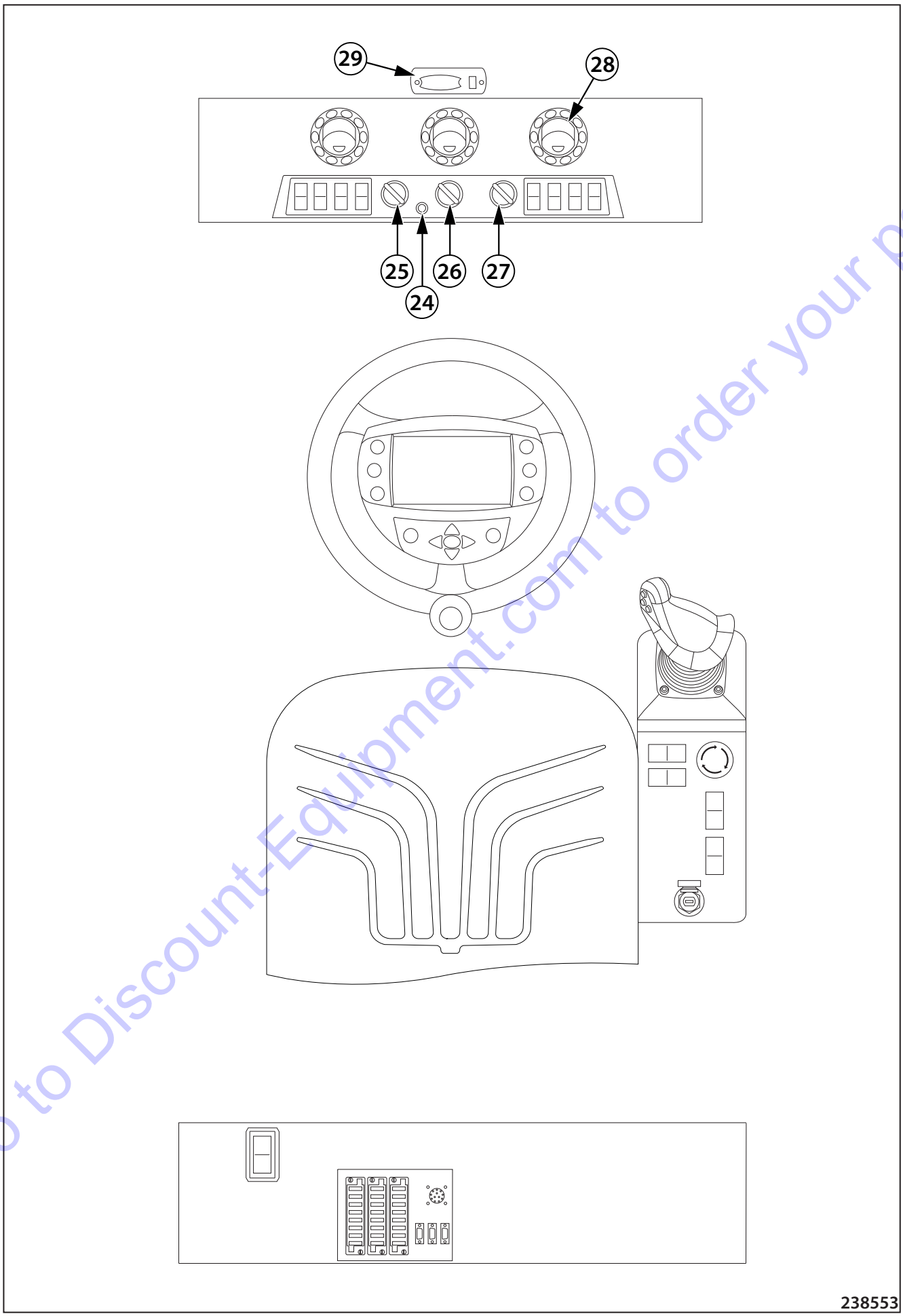
Warning lights switch (22)

It is used for turning on/off the warning lights – the function is indicated by flashing the indicator lamp in the warning light switch.


592348

Warning beacon switch (23)
(optional equipment)

It is used for turning on/off the warning beacon.



AMN452

Air-conditioning switch (24)

It is used for turning on/off the air-conditioning system.


2441

Air-conditioning fan speed switch (optional equipment) (25)

Air flow control.

0 – OFF

1 – minimum

2 – medium

3 – maximum

Heating temperature control (26)

It is used for adjusting the air temperature.


AMN469

Heater fan speed switch (27)

Air flow control.

0 – OFF

1 – minimum

2 – medium

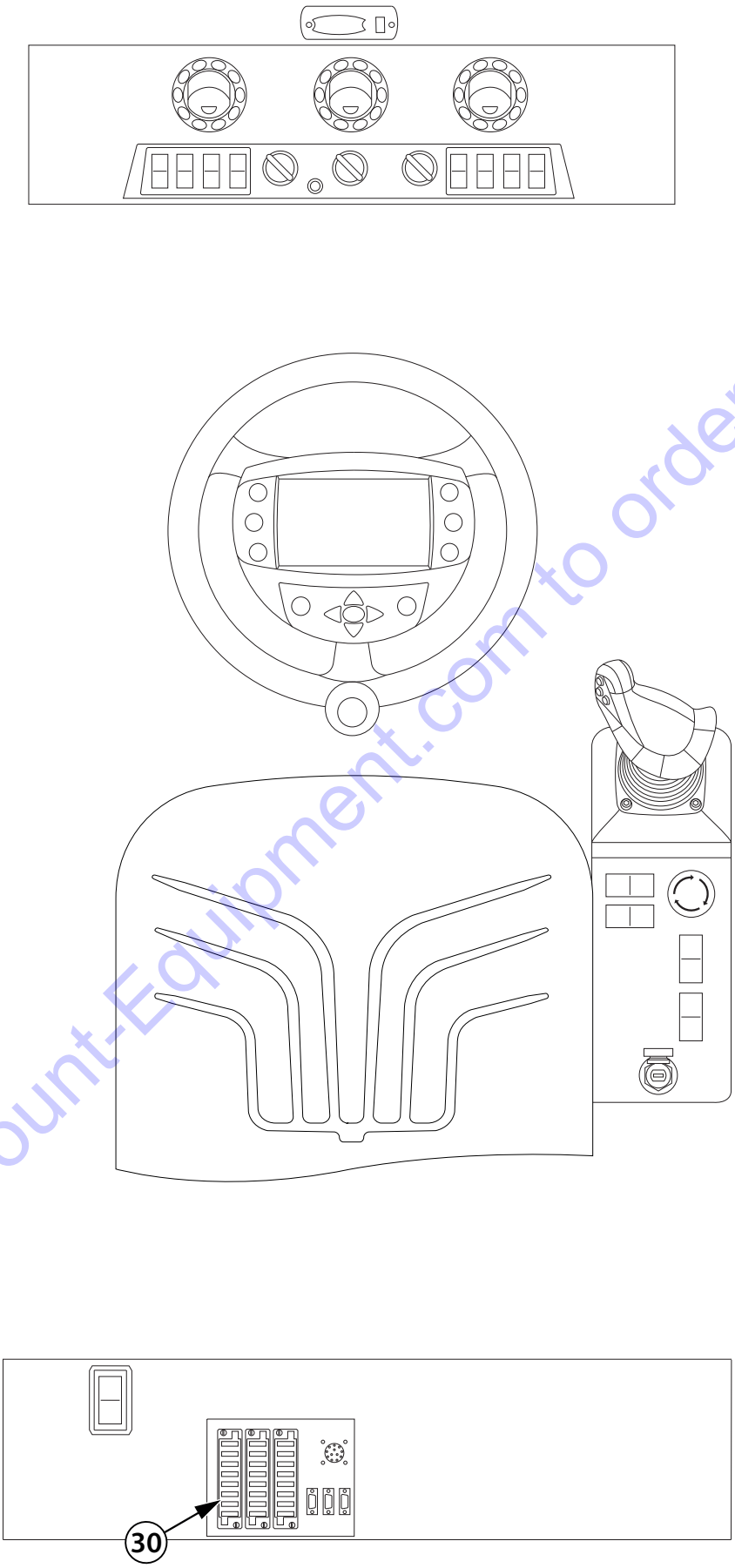
3 – maximum

Air-conditioning outlets (28)

The adjustment and angle of the flaps allows you to change the quantity and direction of the air flow.


592305

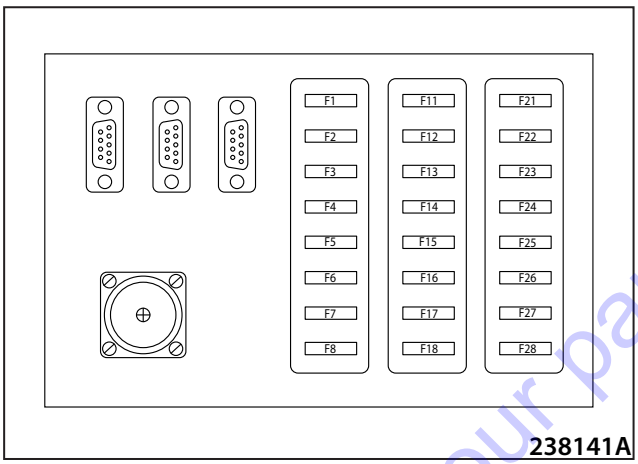
Cab lighting (29)



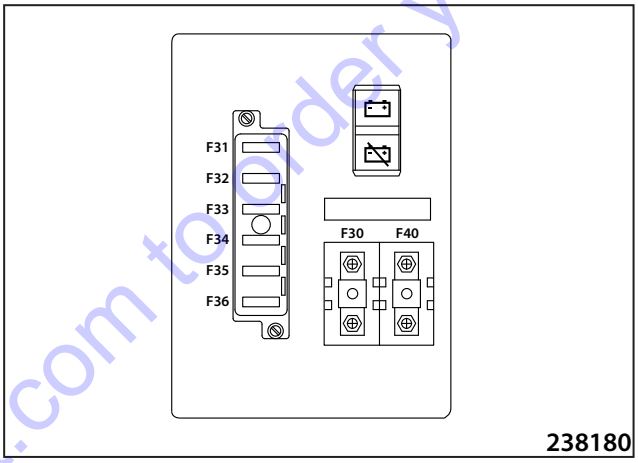
238554

Fuse box (30)

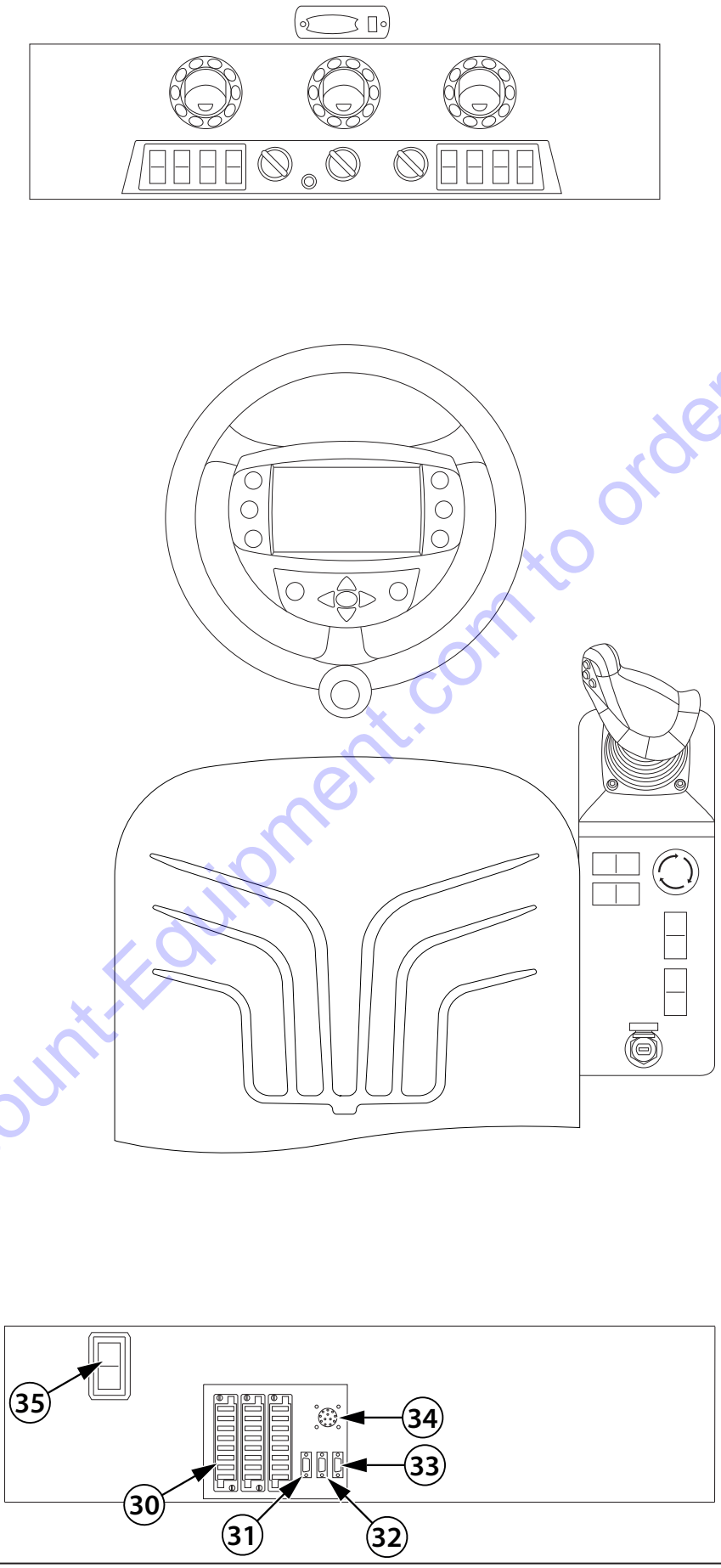
Fuse (F1)	10 A	Sockets 12 V
Fuse (F2)	15 A	Parking lights, Rear lights, License plate lighting, Road lighting, Cab and bonnet lifting valves
Fuse (F3)	7.5 A	Front headlights, Rear headlights
Fuse (F4)		Reserve
Fuse (F5)	10 A	Cooling fan, RC
Fuse (F6)	7.5 A	Horn, Cab lighting, Directional lights, Beacon, Brake lights
Fuse (F7)	30 A	RC control unit
Fuse (F8)		Reserve
Fuse (F11)	5 A	Engine control unit
Fuse (F12)		Reserve
Fuse (F13)	5 A	Back signal horn, Alternator excitation
Fuse (F14)	10 A	Exciter frequency sensor, Left wheel speed sensor, Fan speed sensor, Low vibration, High vibration
Fuse (F15)	10 A	RC, Brake light, Engine control unit
Fuse (F16)	1 A	RC control unit
Fuse (F17)	7.5 A	Gessmann lever, Engine diagnosis socket, Display
Fuse (F18)	15 A	SCR – NOx sensors
Fuse (F21)	15 A	Converter 24 V/12 V
Fuse (F22)	10 A	Heating fan, Heating servo valve
Fuse (F23)		Reserve
Fuse (F24)	10 A	Wipers, Screen washers
Fuse (F25)	20 A	Rear window heating
Fuse (F26)	7.5 A	Telematic, ACE
Fuse (F26)	2 A	Green beacon
	5 A	Telematic, ACE, Green beacon
Fuse (F27)	5 A	Tachograph, GPS
Fuse (F28)	5 A	Compaction modul
Fuse (F30)	80 A	Main fuse
Fuse (F31)	20 A	Main fuse of cabin
Fuse (F32)	15 A	Engine computer
Fuse (F33)	25 A	SCR
Fuse (F34)		Reserve
Fuse (F35)	5 A	SCR – urea sensor
Fuse (F36)	15 A	Power supply of electronic memories (Telematic, Radio, ACE Force)
Fuse (F40)	70 A	Engine heating



238141A



238180



238555

Connector CAN 3 (ACE) (31)

It is used for connecting an external computer (laptop) to determine proper communication between the CM module, the ACE display and the RC computer.

Connector CAN 1 (diagnostics) (32)

It is used for connecting an external computing unit (notebook) to ensure correct communication between the travel control and RC computer. After connecting to this bus using Bodas software, you can update PC, parameterize, troubleshoot, etc.

Connector CAN 2 (33)

It is used for connecting an external computing unit (laptop) to ensure correct communication between the engine, RC computer, display and travel control.

Engine diagnostics (34)

It is used for connecting to ECM (Electronic Control Module) – engine control unit and troubleshooting.

Note

ECM processes engine function data and controls the engine. Sensors pick up information about the engine function and its malfunctions and transfer them to ECM. The control unit evaluates inputs and transmits back commands for the engine to function properly. Failures and other engine data are identified and stored in ECM memory. The engine function and failure data are transferred after the service equipment (notebook) is connected to the socket.

Service switch (35)

The service switch is located down on the left in the rear part of the cab.

The service switch locks an unpredictable machine response, allows safe movement around the machine during routine maintenance and servicing of the machine.

When the service switch is enabled and the engine is off:

- A service switch icon lights on the display.
- The engine cannot be started.

When the service switch is enabled and the engine is running:

- A service switch icon lights on the display.
- The machine is always braked independently of the travel control position.
- The engine speed can be increased by moving the travel control to the "F" position.
- Power outputs of the control unit are disconnected.

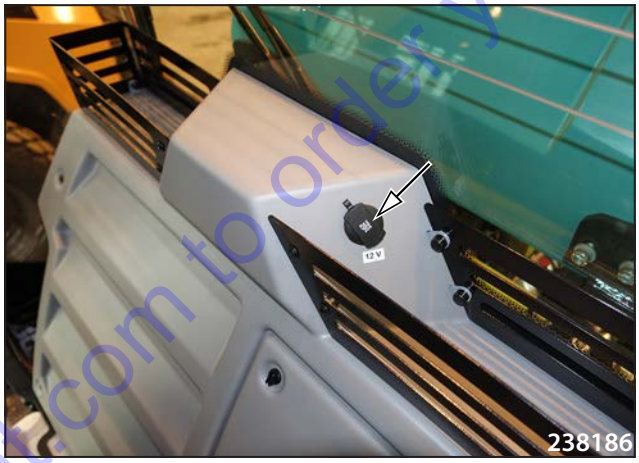
Always enable the service switch after moving the travel control (3) to the brake position (P).

Always use the switch while servicing.

It is forbidden to use the service switch for stopping the machine.

Mounting socket

The mounting socket is used for connecting a lamp or other equipment (12 V).



Fire extinguisher (optional equipment)

Place to install a fire extinguisher.

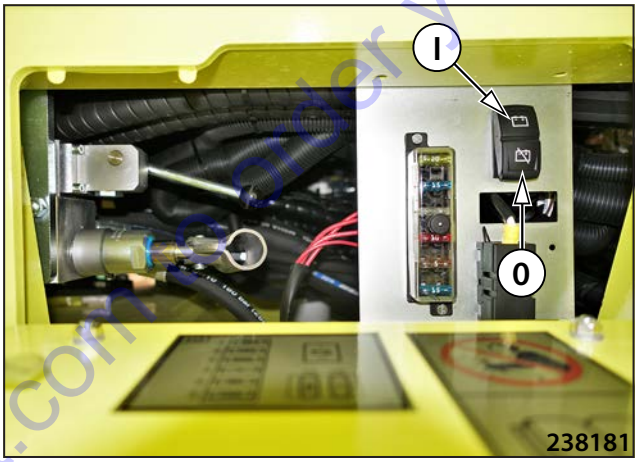
The manufacturer recommends that the machine be equipped with a fire extinguisher.

Windscreen washer tank

Fill with standard available media.

Fill with antifreeze or drain before the winter season starts!

Battery disconnector



It is used for disconnecting the battery from the machine frame.

Position "0" – Electrical installation of the machine disconnected.

Position "I" – Electrical installation of the machine connected.

Pump control lever

It is used for controlling the hand pump for releasing the machine brakes and cab lifting.

Brake block lever

It is used to select cab lifting or lowering and releasing the machine brake.

Upper position – cab lifting

Middle position – machine brake release

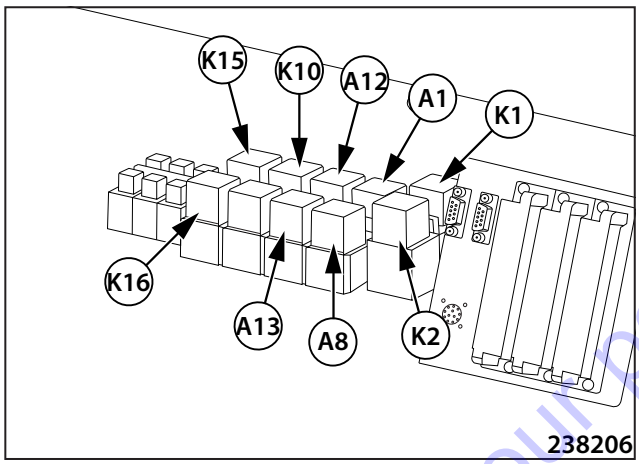
Lower position – cab lowering

Relays

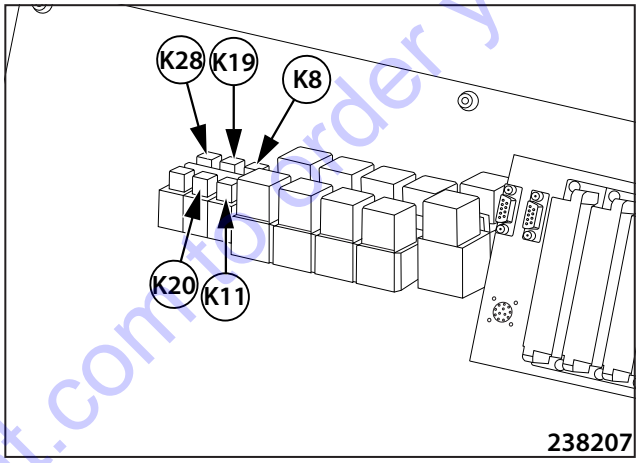
Relays are located under a plastic cover behind the seat.

K1, K2 – Power circuit 15/54
K8 – Reversing horn relay
K10 – Air-conditioning relay
K11 – Engine blocking relay
K15 – Rear window heating relay
K16 – Road lights relay
K19 – Brake lights relay
K21 – Engine start contactor – a part of the engine
K22 – Glowing contactor
K28 – Blade valve control relay – floating position

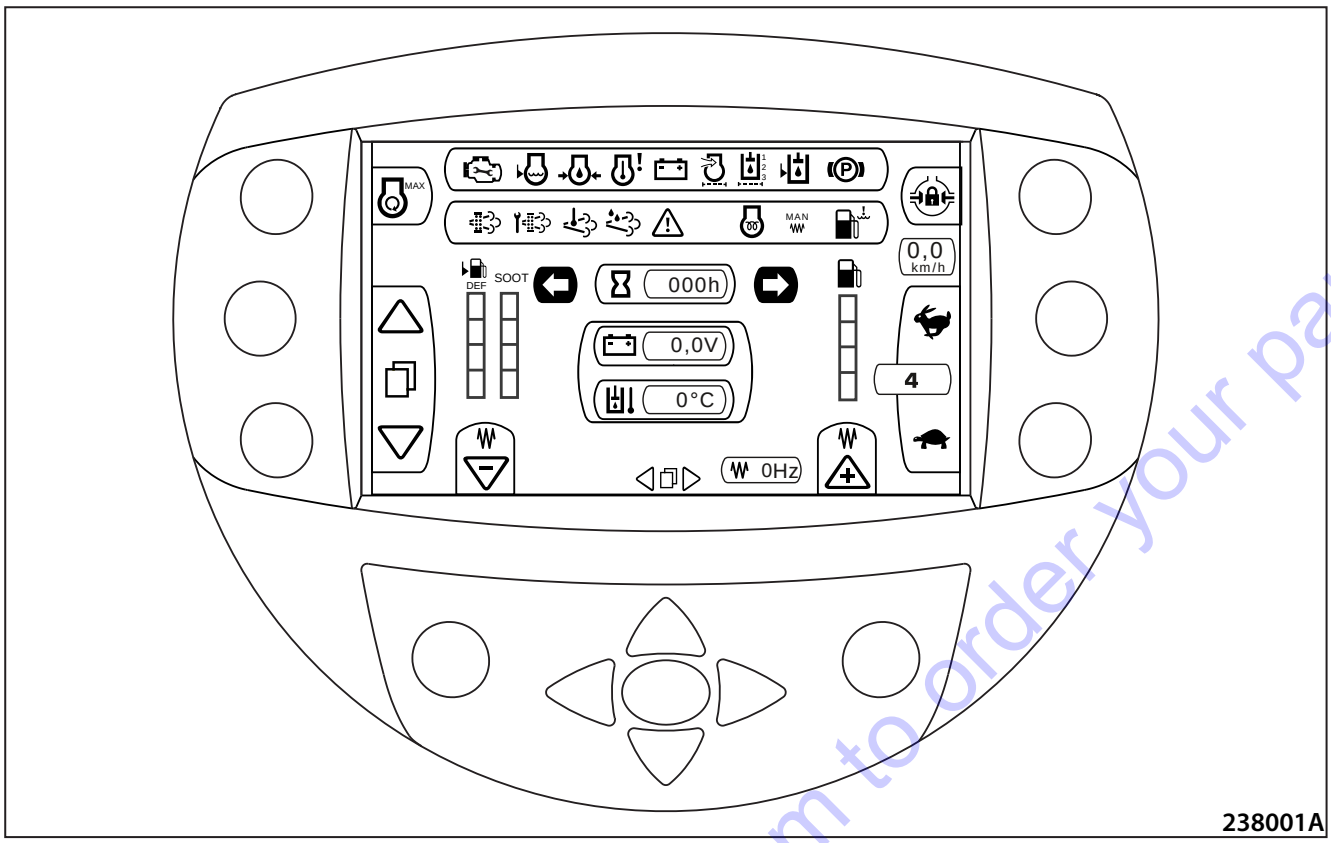
A1 – Direction indicator signal breaker
A8 – Rear window heating timer – 5 min
A12 – Front wiper intermittent
A13 – Rear wiper intermittent



238206



238207



238001A

2.6.1 Display control – operation screen

It is used for controlling the machine and getting information during operation of the machine.

AMN112

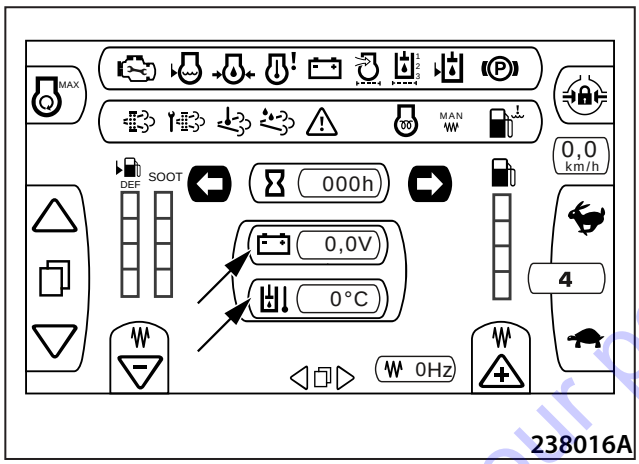
Maximum engine speed button

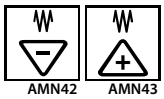
It is used for setting the engine operating speed.

Buttons to browse values

The buttons are used for changing the displaying between eight parameters (engine lubrication pressure, vibration frequency, coolant temperature, engine load, hydraulic oil temperature, current fuel consumption, engine speed, battery voltage, engine speed).

Each of the buttons displays parameters in a separate field.



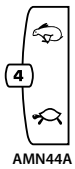


Vibration frequency buttons

The buttons are used for adjusting the vibration frequency.

Frequency I – 31 Hz (1,860 VPM)

Frequency II – 35 Hz (2,100 VPM)



Speed gear indicator

The indicator is used for displaying the engaged speed gear.

Do not exceed the 30-minute time limit while driving at the transport speed (4th speed gear – HX, 5th speed gear – D). Risk of overheating of machine parts!

The speed gear 0 is adjusted as initial 15 minutes after the switch box is turned off.

Loading mode (speed gear 0)

The differential lock and the working (vibration) functions of the machine are locked in the speed gear 0.

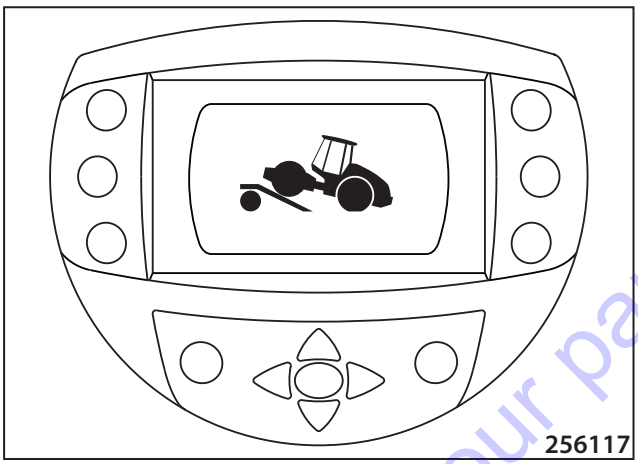
The loading mode icon will appear in the middle of the display.

Machine without ATC

When loading the machine, the drum slip control function is automatically active in the loading mode.

Machine with ATC

When loading the machine, the differential ATC lock is automatically active in the loading mode.



Differential lock button

It is used for turning on the differential lock.

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

Speed gear 0

The differential lock button is enabled automatically in the speed gear 0.

Speed gear 1–3

The differential lock can be enabled manually only in the speed gear 1–3.

Speed gear 4 and 5

The differential lock button cannot be enabled in the speed gear 4 and 5.

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

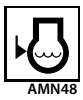

AMN47

Engine failure indicator lamp

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 enabled.

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


AMN48

Coolant level indicator lamp

The indicator lamp indicates low coolant level.

The lighting indicator lamp during operation of the engine indicates a failure. The engine stalls – the machine stops and the parking brake is enabled.

The engine can be started only after the failure is repaired and the coolant is refilled to the specified limit!


AMN113

Engine lubrication indicator lamp

If the indicator lamp lights up after the engine is started or while driving, it indicates an engine lubrication failure. Stop the machine and remove the fault.

Start the engine only after the defect is repaired!

Engine overheating indicator lamp

The indicator lamp indicates a high temperature of the engine.

The lighting indicator lamp during operation of the engine indicates a failure. The engine stalls – the machine stops and the parking brake is enabled.

Red indicator lamp – engine overheating

Blue indicator lamp – cold engine (engine oil temperature < 20 °C, hydraulic oil temperature < 15 °C)

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

Battery charging indicator lamp

It indicates that the battery charging function is in order. After the key in the ignition box (18) is switched over to the position "I", the indicator lamp must light up and it must go off after the start-up.

If the indicator lamp does not go off or it lights up while driving, turn the key in the ignition box to the "0" position and look for a fault!

Air filter clogging indicator lamp

The lighting indicator lamp indicates that the filter element is clogged above the allowed limit.

Stop the machine and replace the cartridge immediately!

Indicator lamp of hydraulic oil filter clogging

The lighting indicator lamp indicates that the filter cartridge is clogged.

Immediately replace the element!

Indicator lamp for hydraulic oil level

The lit indicator lamp indicates a low hydraulic oil level.

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

Repair the fault and refill the oil to the specified limit.

Parking brake indicator lamp

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


AMN118

Indicator lamp of clogged SCR catalyst (Selective Catalytic Reduction) – crystallisation

The indicator lamp signals the requirement to regenerate the SCR catalyst.


AMN119

Indicator lamp of DPF (Diesel Particulate Filter) cleaning

The machine is not equipped with a DPF.


AMN120

Indicator lamp of high temperature of exhaust gases

The indicator lamp signals the SCR (Selective Catalytic Reduction) regeneration in progress or exceeding of limit temperature of combustion gases at normal operation.


AMN128

DEF (AdBlue) level indicator lamp

The indicator lamp indicates low level of DEF (AdBlue). Refill DEF (AdBlue). The indicator lamp indicates the DEF (AdBlue) quality.

Danger in handling DEF (AdBlue). Proceed according to Chapter 3.6.5.

Use only DEF (AdBlue) according to the specification in chapter 3.2.6.

Fill DEF (AdBlue) according to Chapter 3.6.5.


AMN58

Danger warning

The indicator lamp and an audible signal indicate a diagnostic error of the machine electronics.

In case of a serious failure, the machine changes to the emergency mode (travel gear 0, working functions disabled).

An error message will be displayed. After the machine is turned off with the key, the error will be reset. After turning the key to the "I" position, a test is carried out to determine whether the fault persists.

If an error occurs repeatedly that you are not able to remove, shut down the machine and call the service. For easier communication with the service team, check error messages on the service screen (3rd screen) and copy down codes of all diagnosed errors of the engine control unit and machine control unit.

The indicator lamp comes on, for example, if the machine vibrates for 30 seconds on the spot. Vibrations will be switched off. For restarting the vibration, it is necessary to drive the machine by 8 metres.


AMN453

Engine pre-heating indicator lamp

It indicates the engine warming up before the cold start.

Start the engine after the indicator lamp has gone out!

AMN447

Manual vibration indicator lamp

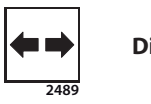
It indicates that the manual vibration is enabled.


AMN57

Fuel filter indicator lamp

The lighting indicator lamp indicates water in the fuel filter.

If this indicator lamp is lighting, clean the coarse fuel filter!


2489

Direction indicator lamps

595426

DEF (AdBlue) level indicator

The indicator shows the DEF (AdBlue) level in the tank. Low level indicated by audible alarm. The engine power is reduced at the lack of DEF (AdBlue).

Fill DEF (AdBlue) according to Chapter 3.6.5.

AMN407

Soot level indicator

It displays the soot clogging level of the SCR catalyst in %.


595425

Fuel gauge indicator

The indicator shows the fuel level in the tank.


AMN73

Counter of worked engine hours

AMN64

Vibration indicator

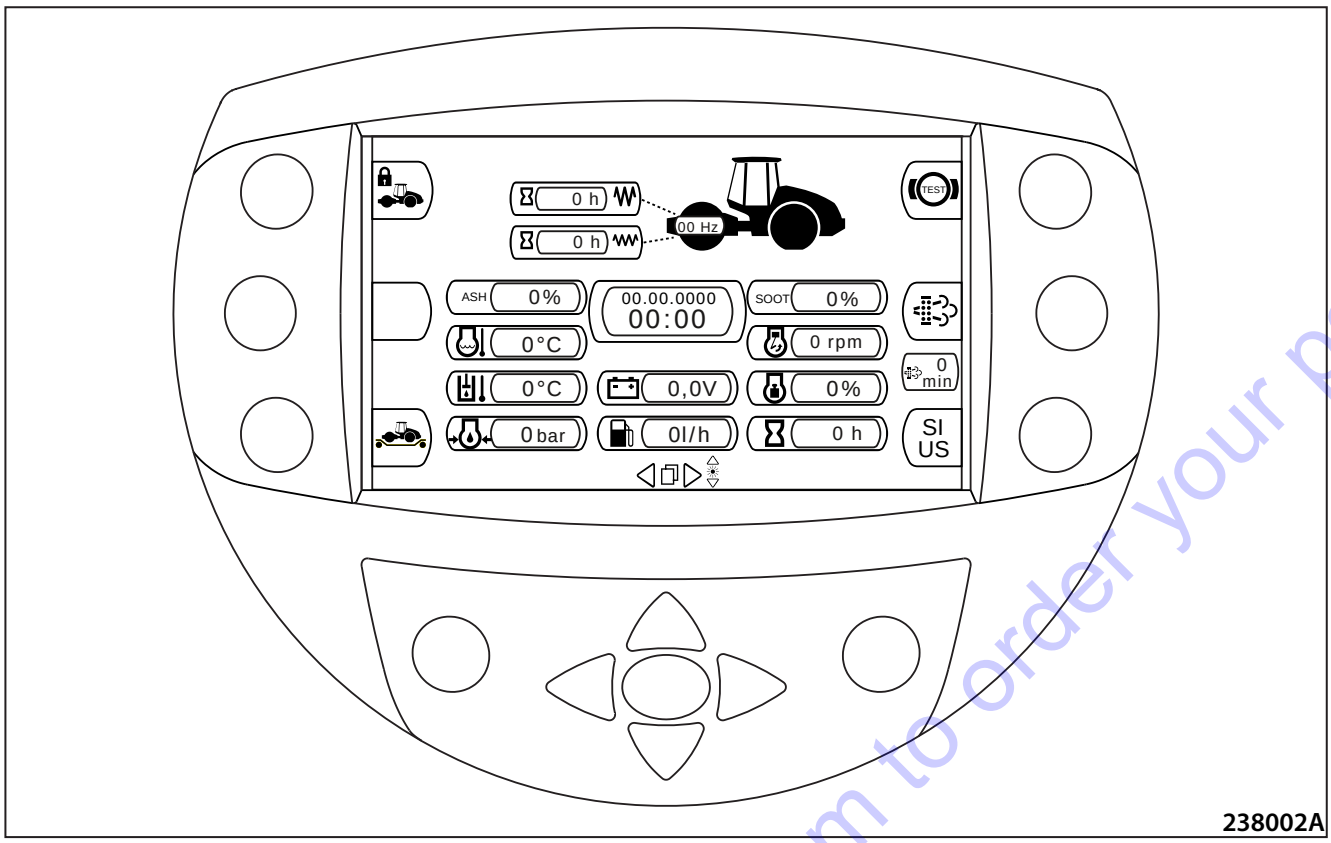
The indicator shows the selected amplitude and frequency.


AMN66

Screen switching

Press the button to view the following screen for 15 seconds.

Hold the button for 5 seconds to display the current screen permanently.



238002A

2.6.2 Display control – Information screen

It is used for controlling the machine and getting information during operation of the machine.

AMN400

Ignition lock button

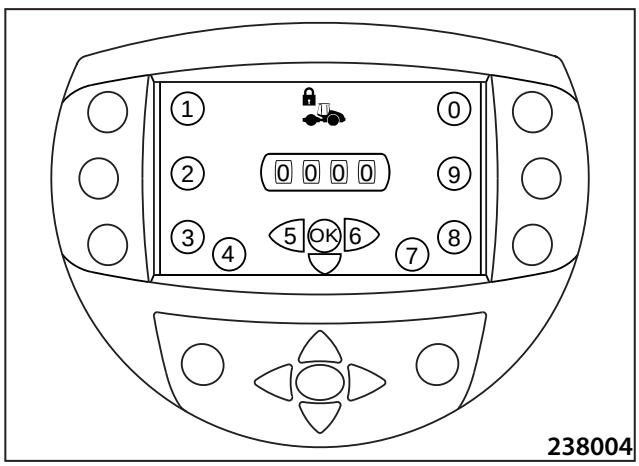
It is used for enabling and disabling the ignition lock.

The ignition lock prevents the engine from starting until PIN is entered.

Procedure:

- press the ignition lock button (a screen will be displayed to enter the PIN),
- enter PIN,
- confirm by pressing the OK button for 4 seconds (audible signal will be heard).

After the key is off for more than 15 minutes, entering PIN will be required at the next engine start.



238004

Transport mode button

It is used for enabling and disabling the transport mode. The activation and deactivation is done by entering PIN.

The active transport mode is indicated by the icon on the display.

The transport mode of the machine is set by the manufacturer and is used for shipment and transportation of the machine to a customer.

Only the following functions are enabled in the transport mode:

- differential lock ON,
- speed gear 0 ON – speed 0–3 km/h (0–1.9 MPH).

These functions are disabled in the transportation mode:

- working functions of the machine (vibration),
- speed gear changing.

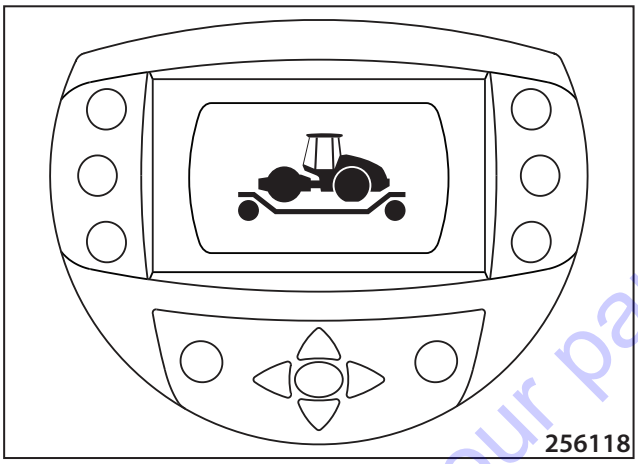
Procedure:

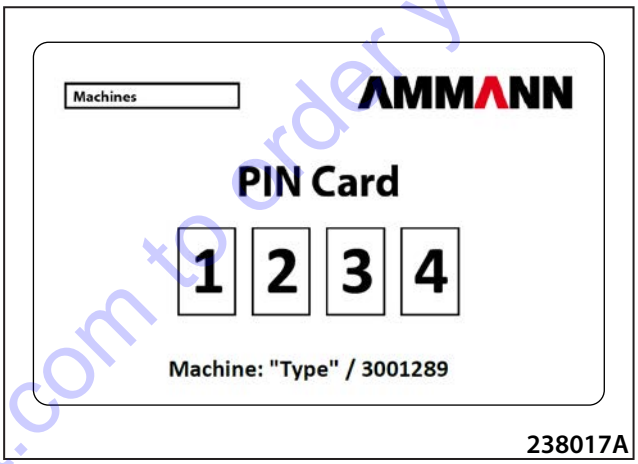
- press the transport mode button (the screen will be displayed to enter the PIN),
- enter PIN,
- confirm by pressing the OK button for 4 seconds (audible signal will be heard).

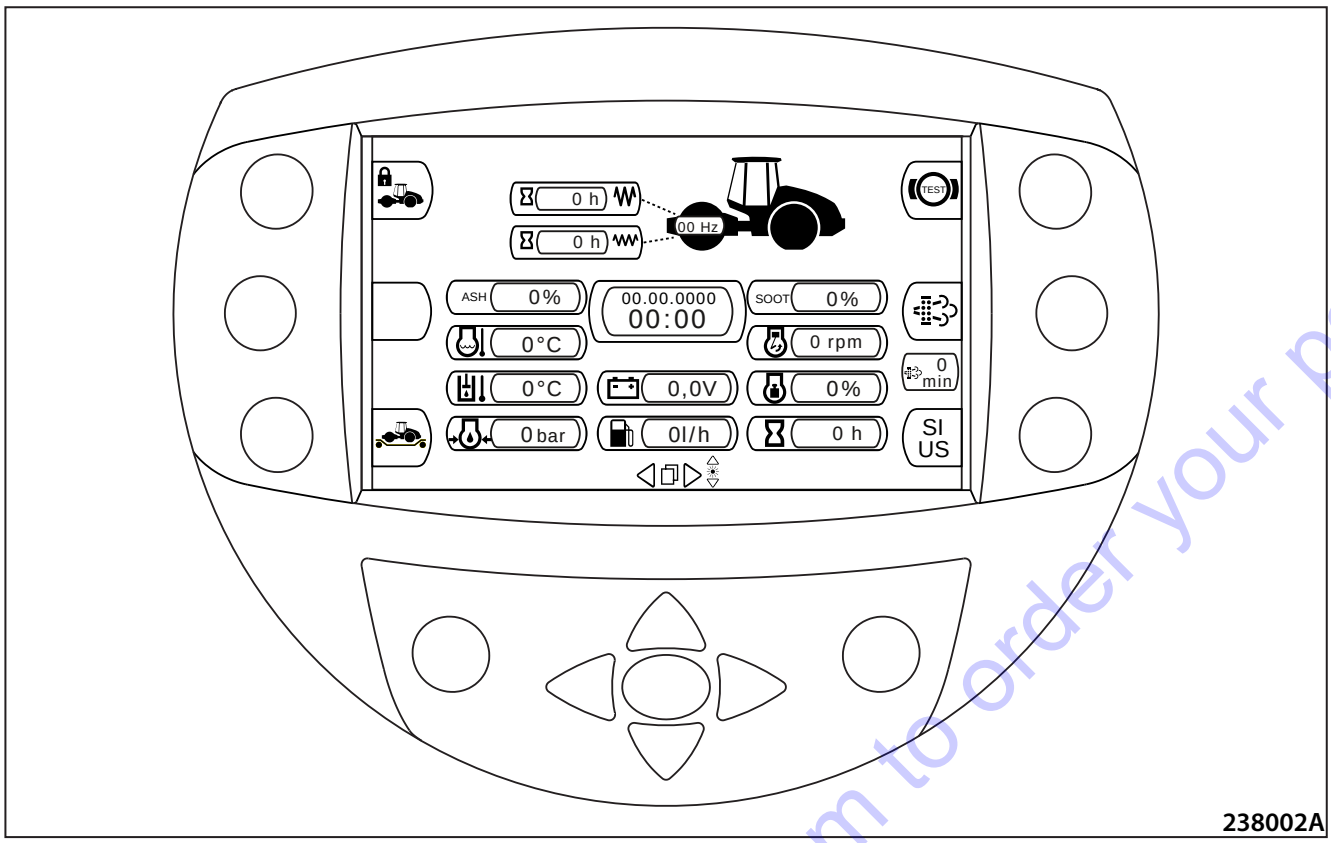
To enable and disable the ignition lock or transport mode, use the same PIN code.

For the PIN code, see the PIN card in the documentation set. There are two PIN cards supplied with the machine.

If you lose the PIN card, you can contact your dealer and get your correct PIN code for your machine.







238002A

AMN69

Brake test button

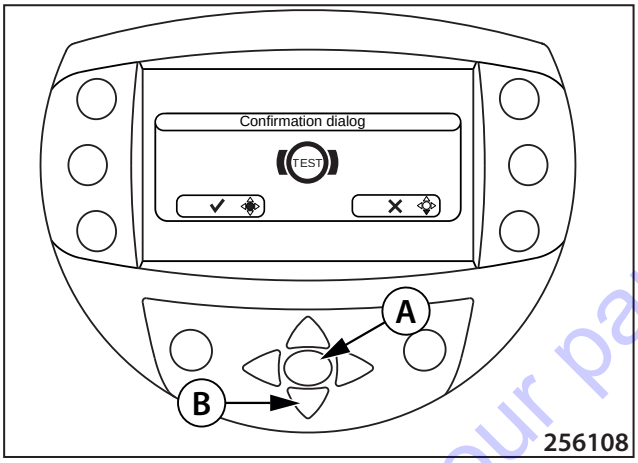
It is used for checking the machine brakes for correct operation (the operator is prompted to check the brakes every 24 hours).

After you press the brake test button, a confirmation dialog will appear.

Press the middle button (A) to confirm the start of the brake test.

Press the lower button (B) to cancel the start of the brake test.

Perform the brake test according to Chapter 3.6.12.



256108


AMN118

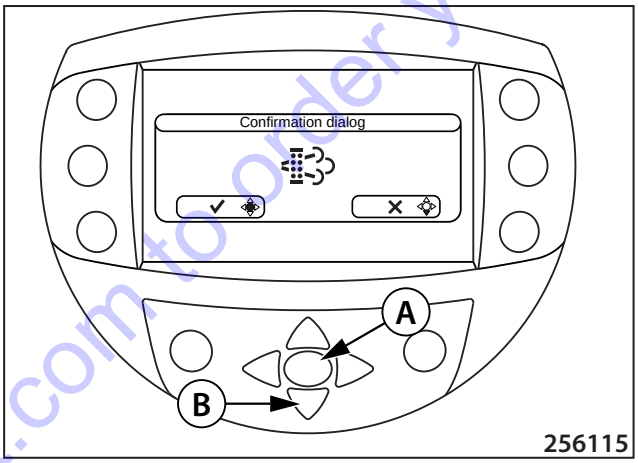
Regeneration button

It serves for enabling the SCR catalyst regeneration.

After you press the brake test button, a confirmation dialog will appear.

Press the middle button (A) to confirm the start of the SCR catalyst regeneration.

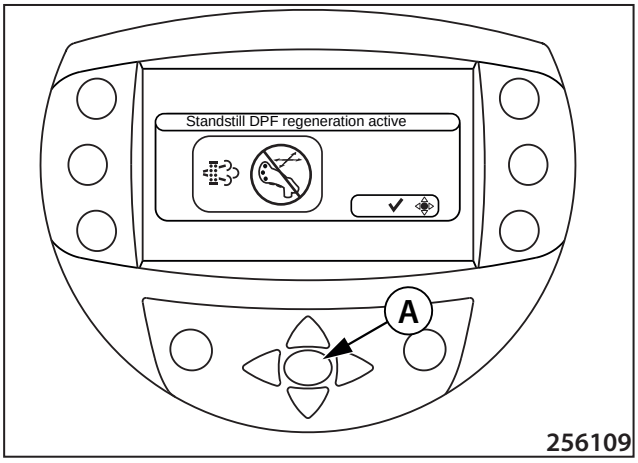
Press the lower button (B) to cancel the start of the SCR catalyst regeneration.



256115

After the start of the SCR catalyst regeneration is confirmed, the following information dialog will appear:

- SCR catalyst regeneration enabled.
- It is forbidden to move with the travel control.

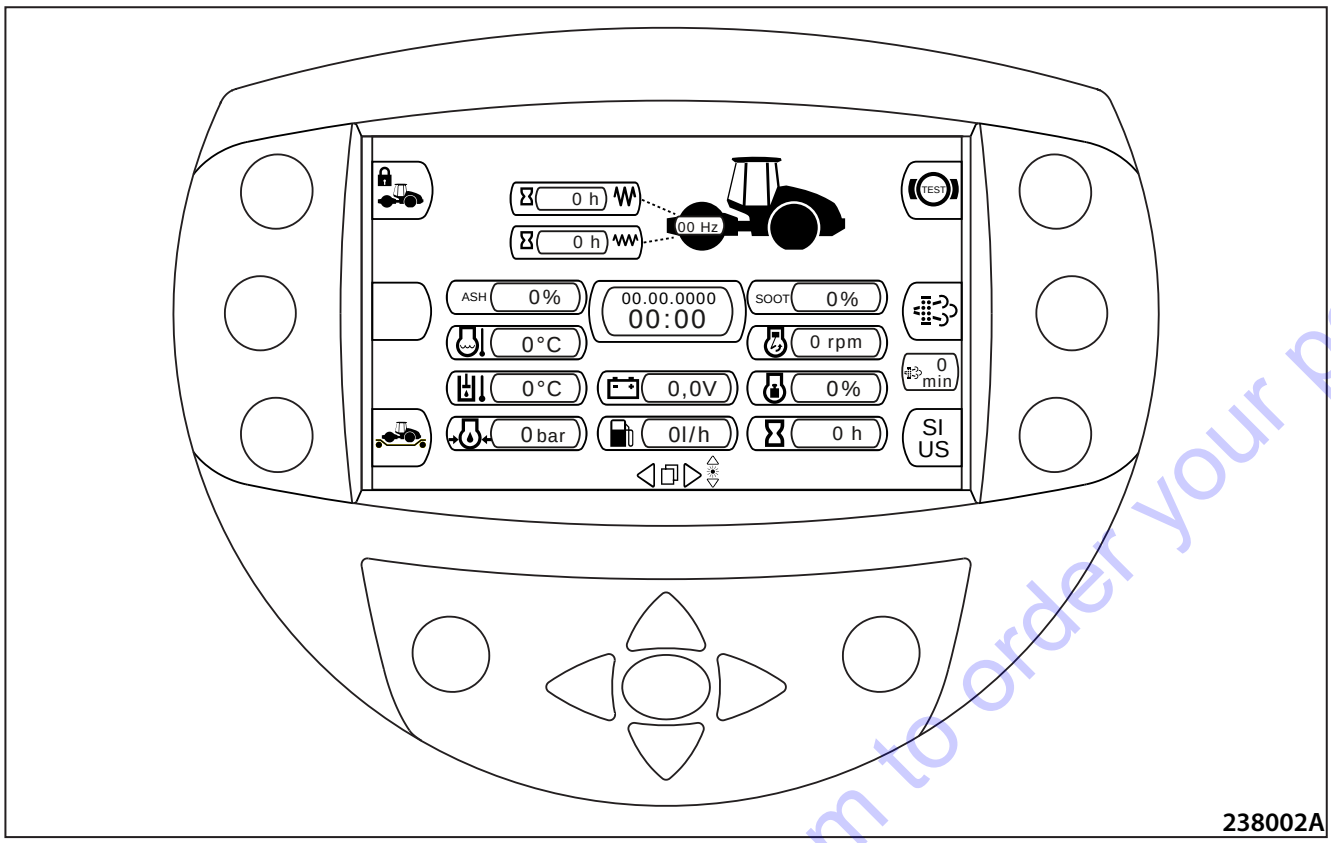


256109

Note

The dialog will appear when the SCR catalyst regeneration is started or if the function is enabled and the operator has not pressed any button for more than 60 seconds.

The dialogue can be confirmed by pressing the middle button (A).



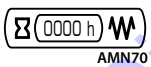

AMN417

Regeneration duration indicator

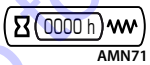
It serves for displaying the time required for completing the SCR catalyst regeneration.


AMN244

Button for switching between SI/US units


AMN70

Worked hours indicator – amplitude I


AMN71

Worked hours indicator – amplitude II


AMN74

Date and time indicator

Setting:

Hold the OK button pressed for 5 seconds.


AMN114

Set the date and time using the arrows.


AMN76

Coolant temperature indicator


2635

Hydraulic oil temperature indicator

It shows the current hydraulic oil temperature.

Stop the machine and check the oil level, or look for a defect!


AMN113

Engine lubrication pressure

It shows the engine lubrication pressure in kPa.


2777

Current battery voltage indicator


595425

Current fuel consumption indicator


AMN77

Motor speed indicator


AMN75

Engine load indicator

It shows the current engine load in %.


AMN73

Counter of worked engine hours


AMN66

Screen switching

Press the button to view the following screen for 15 seconds.

To set the following screen as the home screen, hold the button for 5 seconds.


AMN105

Display backlight

The display backlight intensity can be adjusted using the buttons.

AMN406

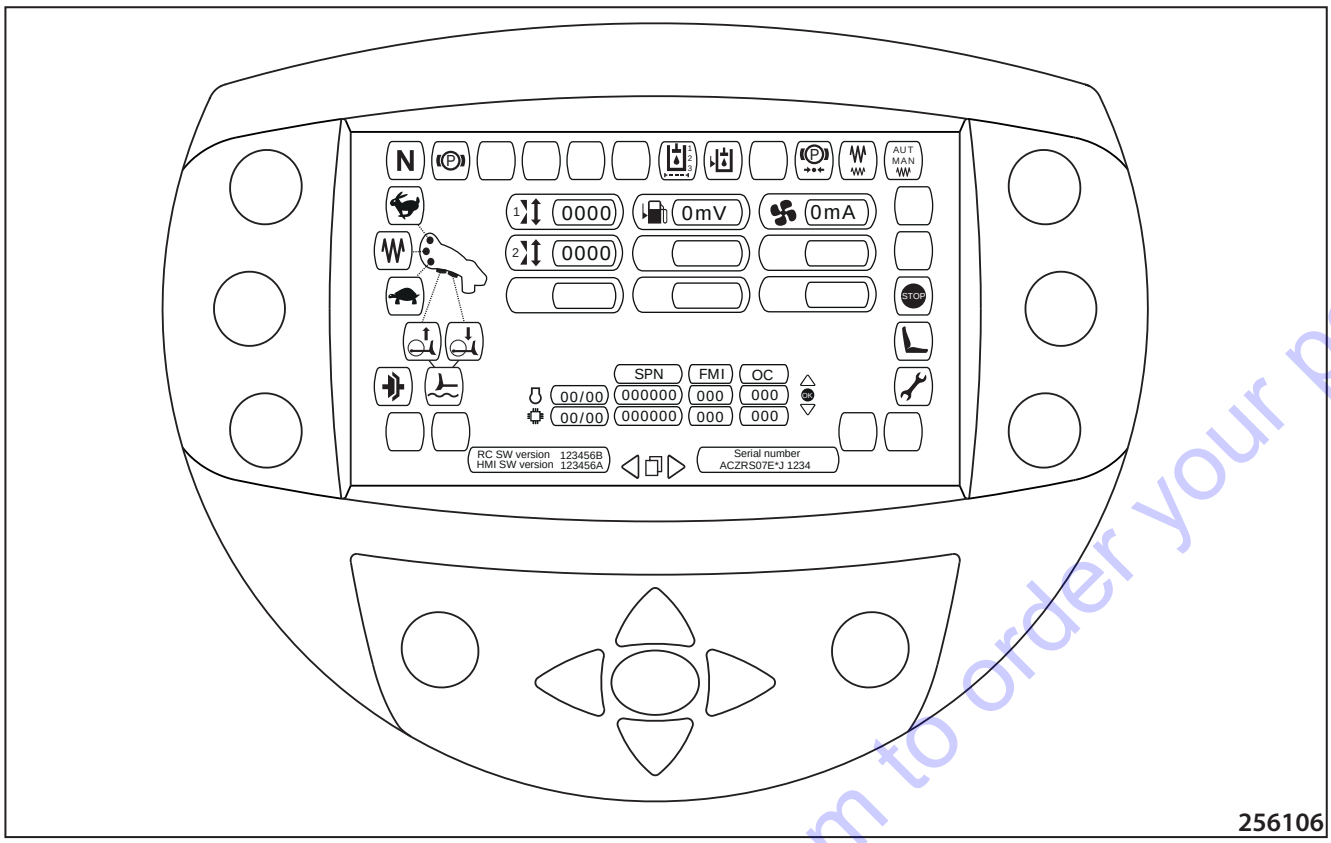
Ash clogging indicator

It shows the ash clogging level.

AMN407

Sooting indicator

It shows the sooting level.



256106

2.6.3 Display control – Service screen

The screen is used for basic diagnostics of inputs into the machine control unit and for displaying error messages.

AMN132 **Start up conditions met**

AMN404 **Blade floating position**

AMN402 **Blade button – down**

AMN403 **Blade button – up**

AMN468 **Travel speed decrease button**

2612 **Vibration button**

AMN467 **Travel speed increase button**

AMN82 **Lever in the neutral position**

2703 **Lever in the parking brake position**

3349 **Switch of indication of hydraulic oil filter clogging**

591507 **Hydraulic oil level switch**

AMN432

Pressure parking brake switch


AMN129

Amplitude I switch

Amplitude II switch

AMN130

Automatic vibration switch

Manual vibration switch

AMN90

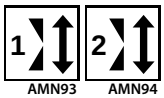
Emergency brake switch


AMN92

Seat switch


3701

Service switch



AMN93 AMN94

Travel lever sensor – forward, rearward


AMN98

Fuel level sensor


594701

Output to cooling fan

AMN101

SPN (Suspect Parameter Number)
(Failure source information)

AMN102

FMI (Failure Mode Identifier)
(Failure cause information)

AMN103

OC – Occurrence counter


AMN106

Engine error message


AMN107

Machine error message

AMN243

Error list browsing

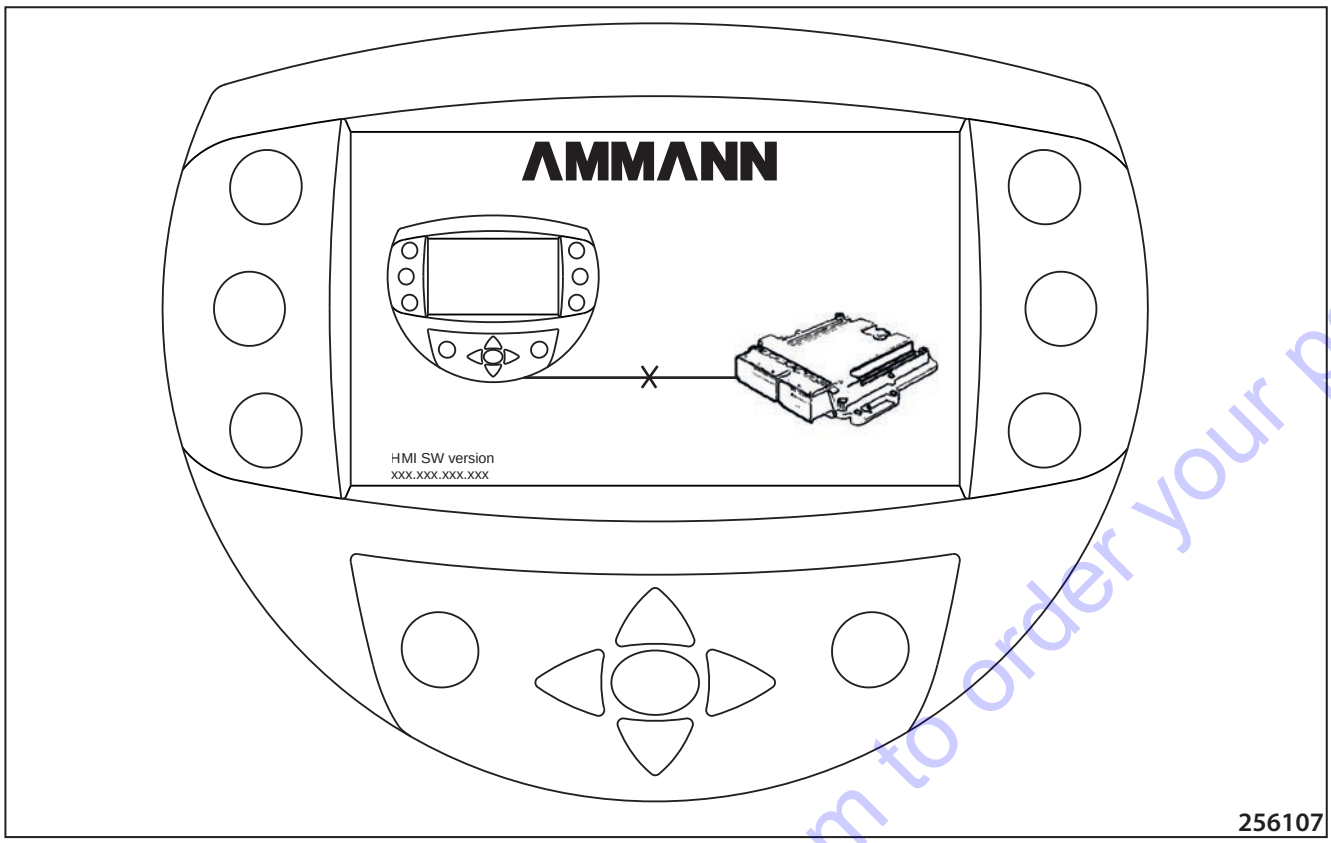
The OK button is used for switching between error lists of the control unit of the engine and of the machine. The arrows are used for scrolling in the error list.


AMN66

Screen switching

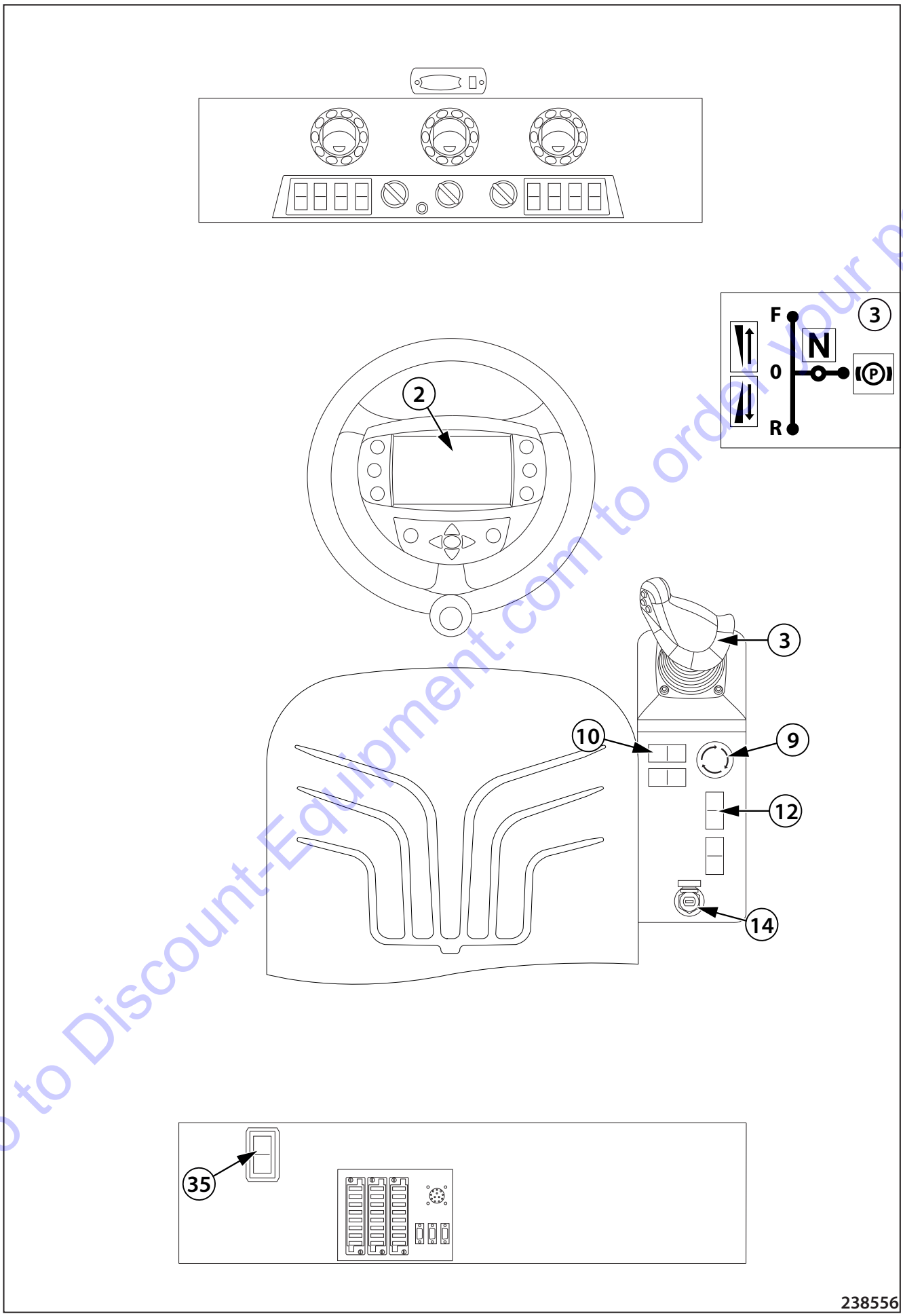
Press the arrow to view the following screen for 15 seconds.

Hold the arrow for 5 seconds to set the following screen as the home screen.



2.6.4 Display disconnected

The screen is shown if the display is not connected to the ECU or a general communication error occurs.



2.7.1 Engine start

- Before starting the engine, daily check the oil level in the engine and hydraulic tanks, coolant level in the cooling circuit and fuel level in the fuel 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 alarm horn to signal the engine starting and check that nobody is endangered by starting the engine!

Daily the machine operator must perform the brake test according to chapter 3.6.12.

Conditions to start the engine:

- The emergency brake is disabled.
- The travel control is in the parking brake position.
- The service switch (35) is disabled.
- No fault is detected.

Start-up procedure:

- Turn on the battery disconnector.
- Sit down on the seat.
- Fasten your seat belt.
- Set the travel control (3) to the brake position (P).
- Check that the emergency brake (9) is not activated.
- Check that the service switch (35) is not enabled.
- Insert the key into the ignition box (14) in the position "0" and switch over to the position "I".
- The unlock code prompt appears on the display (2) if the ignition lock function was enabled.
- Enter the unlock code and confirm by holding the OK button until the operation screen is displayed.
- The brake, charging, lubrication and heating indicator lamps will light up on the display.
- Wait until the pre-heating indicator lamp goes out.
- Use the alarm horn (10) to signal that the engine is starting.
- Turn the key to position "II" to start the engine.
- The charging indicator lamp must go out after the starting is completed.
- After the travel control is changed to the neutral position, the brake indicator lamp goes out.

Note

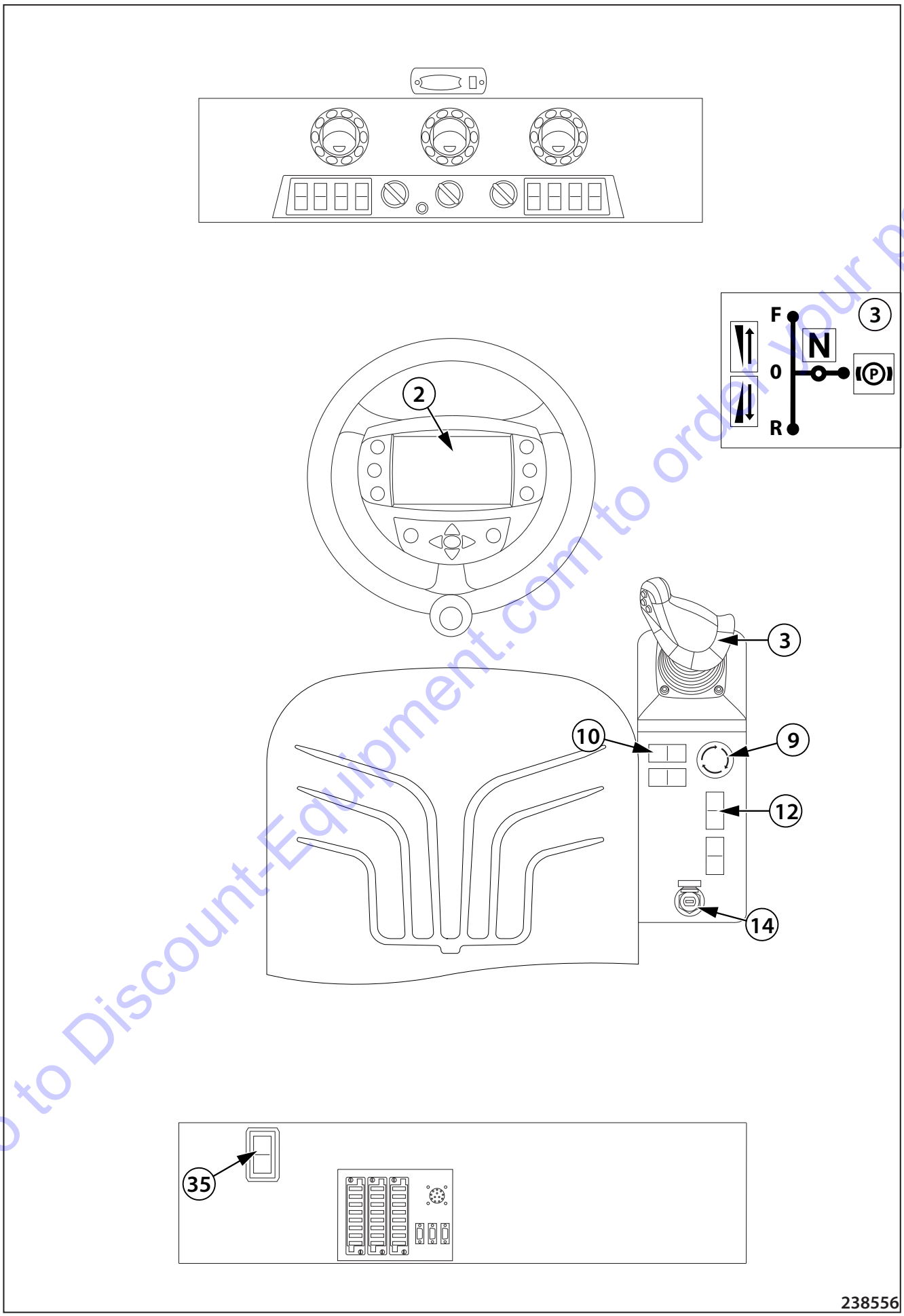
If the start-up fails, turn the key back to position "I". If the engine is not started up even after 3 attempts – check the fuel system.

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 minutes.

Do not let the engine idle for more than 10 minutes – longer idling can result in clogging of injectors, sticking of piston rings or seizure of valves!

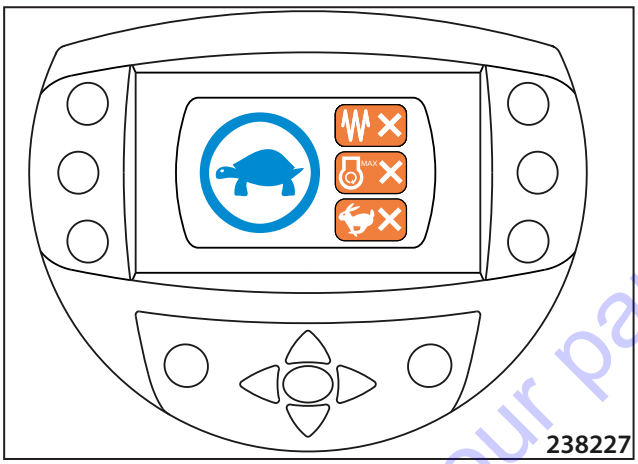
If the coolant temperature does not reach at least 60°C (140°F) – do not load the engine at full power!



Warm-up mode

If the hydraulic oil temperature is below 5 °C, the machine can be operated in warm-up mode.

A warm-up mode icon will appear on the display.

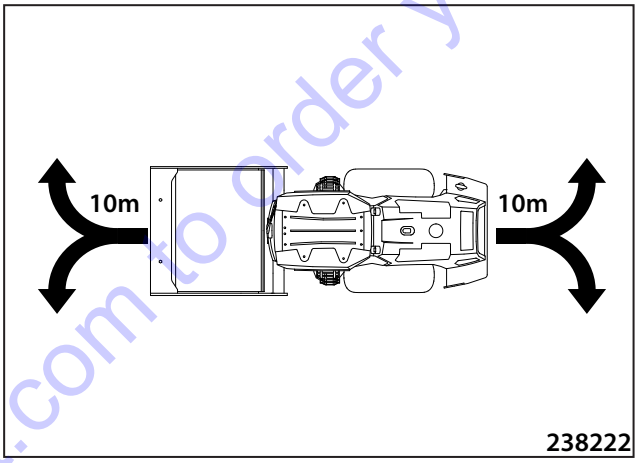


The machine can be operated in limited mode:

- Maximum engine speed 1300 RPM.
- Gear "0" engaged.
- Vibrations off.

A low hydraulic oil temperature is indicated by a blue indicator lamp for hydraulic oil temperature.

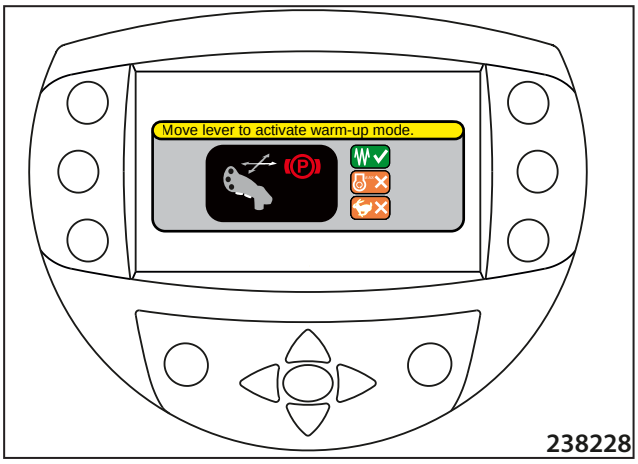
To warm up the machine, drive the machine back and forth alternately to a distance of 10 meters and turn the drum left and right as shown in the figure.



Do not warm up a stationary machine while idling; there is a risk of engine damage!

When the hydraulic oil has warmed up to a temperature of 5–10 °C, a warning will be displayed, accompanied by an acoustic signal, if the travel control (3) is in forward/reverse (F/R) or neutral (N).

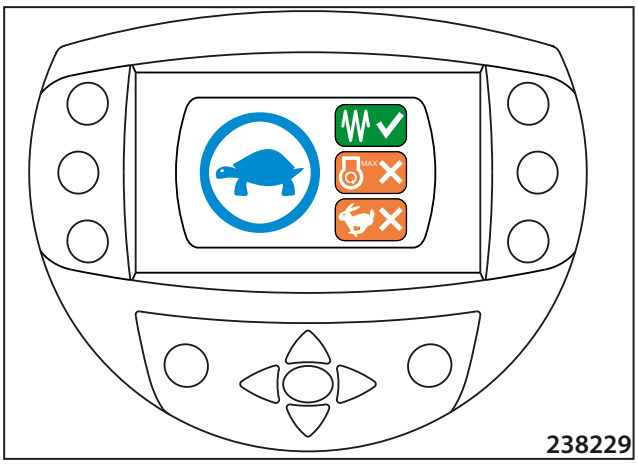
The warning disappears when the travel control (3) is moved to the parking brake (P) position.



A warm-up mode icon will then appear on the display.

- Maximum engine speed 1800 RPM.
- Gears 0, 1 and 2 can be selected.
- Vibration can be switched on.

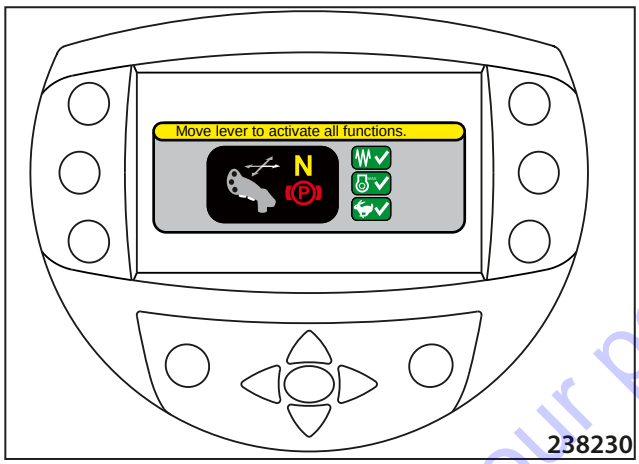
Vibration is limited to frequency I – 28 Hz and frequency II – 27 Hz.

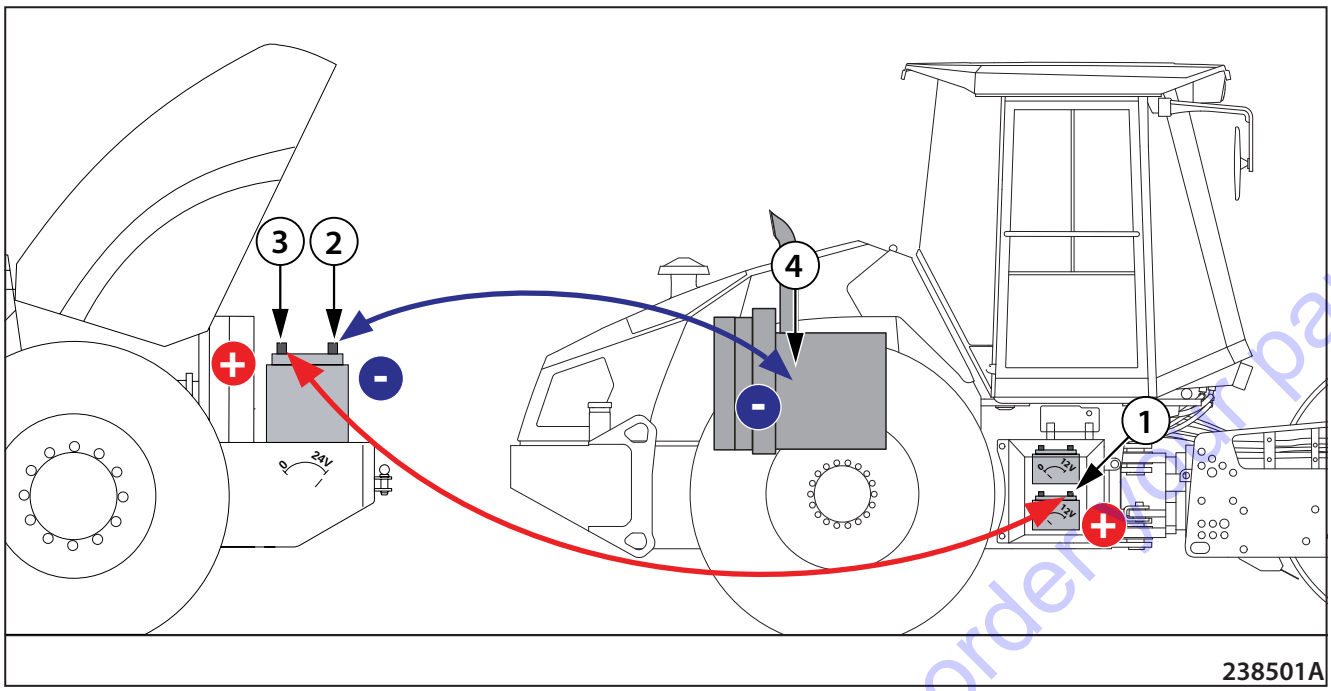


When the hydraulic oil has warmed up to a temperature higher than 10 °C, a warning will be displayed, accompanied by an acoustic signal, if the travel control (3) is in forward/reverse (F/R).

The warning disappears when the travel control (3) is moved to neutral (N) or parking brake (P).

This deactivates the warm-up mode.





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

The starting supply voltage from the external power supply must be 24 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 second 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 second end of the (–) pole of the cable to the part that is attached to the engine (or to the engine block).

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

If two batteries are used in the machine, connect the cable pole to the (+) pole of the discharged battery that is not connected to the (–) pole of the second battery.

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.

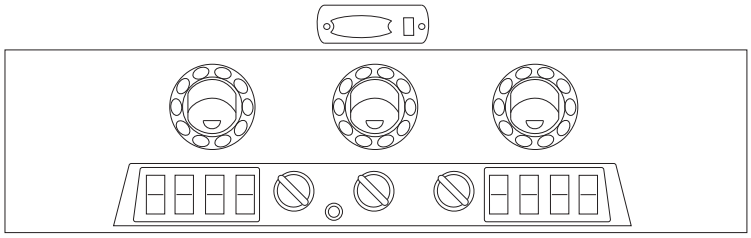
Uninsulated parts of clamps of the jump leads must not touch each other!

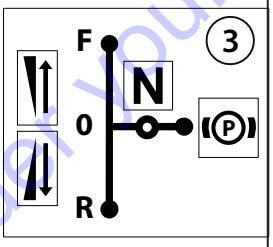
The jump lead connected to the (+) pole of the batteries must not come into contact with electrically conductive parts of the machine – danger of a short circuit!

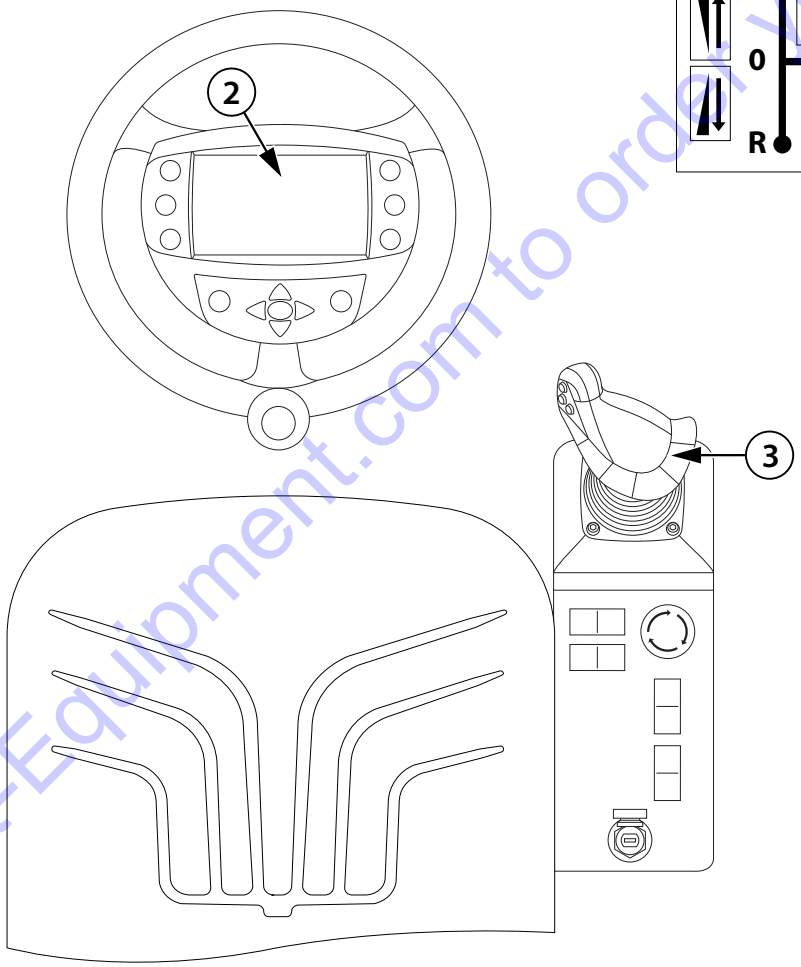
Do not lean over the batteries – possibility of electrolyte burns!

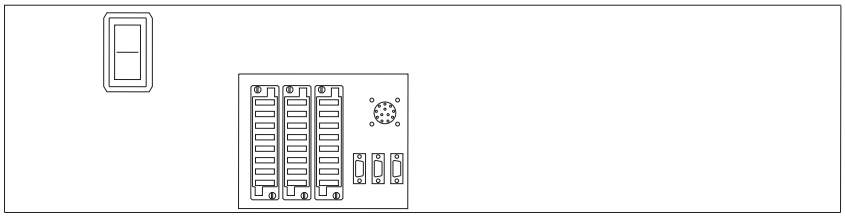
Avoid the presence of ignition sources – open flame, cigarettes, etc.

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









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2.7.2 Drive and reverse drive

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!

Machine travel and reversing:

Selection of travel direction:

- Start the engine
- Move the travel control (3) from the parking brake (P) to the neutral position (N) – the brake will be released and the indicator lamp of the parking brake will go out. The engine idle speed is set.
- Move the travel control (3) to the position (0) and select a travel direction (F/R). The engine speed is set automatically according to the current speed of the machine.

Travel speed selection:

- The travel speed corresponds to the deflection of the travel control (3) from the zero position (0).
- Speed gears can be changed using buttons on the travel control in the range of MIN (tortoise) to MAX (hare).

Panic response

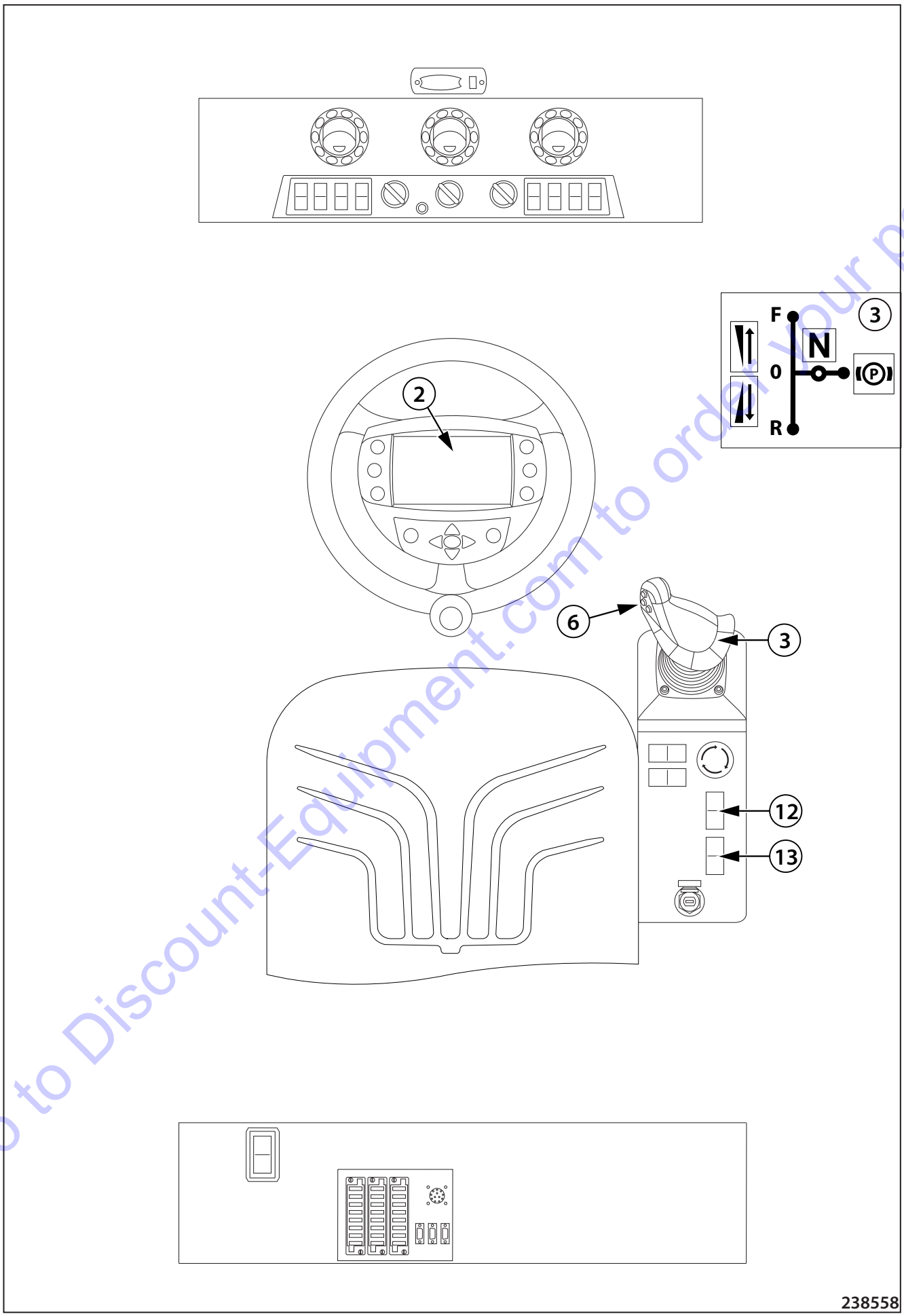
The immediate stop of the machine using the travel control (3) applies to all of the travel modes of the machine. When the travel control (3) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be enabled, the engine will keep running, i.e. panic response. The machine can start moving again after the travel control (3) is changed to the brake position (P) and the travel direction (F/R) is selected.

Note

The speed gear 0 is adjusted as initial 15 minutes after the switch box is turned off. Working functions of the machine are locked in the speed gear 0.

When driving at the transport speed on long distances, stop every 30 minutes for an hour to let the machine cool down. By failing to do so you take the risk of damaging the machine, for which the manufacturer bears no responsibility.

When the traction is lost, the tractive force drops or the engine speed decreases significantly, engage the lower speed gear with the travel control button on the display (2)! If the machine is equipped with the ATC differential lock function, enable the function with the differential lock button on the display (2)!



Travel and reversing with vibration

- Use the switch (12) to select a vibration amplitude.
- Adjust the travel speed in the range of working speeds on the travel control (3).
- Use the switch (13) to select the MAN mode.
- Use the travel control (3) to select a direction.

Turning on:

- Press the button (6) on the travel control (3) to turn on the vibration.

Turning off:

- Turn off the vibration by pressing the button (6) on the travel control (3).
- You can turn off the vibration by changing the travel control (3) to the brake position (P).

Note

The MAN mode allows you to turn on the vibration on a not moving machine if the travel control (3) is in the position (0).

Automatic vibration switching ON/OFF mode (AUT):

Turning on:

- Use the switch (13) to turn on/off this function.
- Press the button (6) on the travel control (3) to turn on the vibration.
- The vibration will be automatically turned on when the travel speed is more than 1 km/hour (0.6 MPH).
- The vibration will be automatically turned off when the travel speed is less than 1 km/hour (0.6 MPH).
- The automatic vibration function remains enabled even after the travel control (3) has been changed through the position (0).

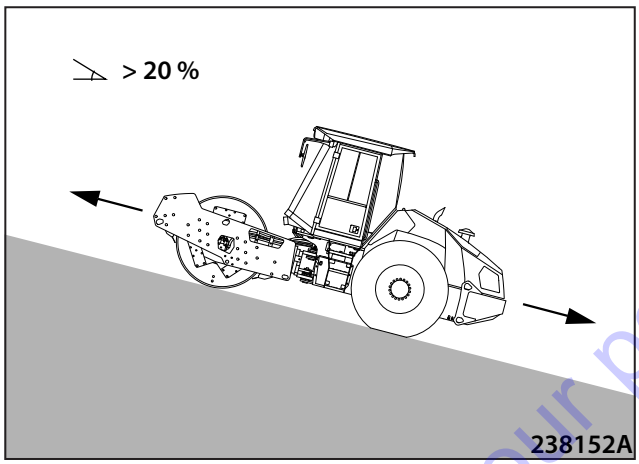
Turning off:

- Turn off the vibration by pressing the button (6) on the travel control (3).
- You can turn off the vibration by changing the travel control (3) to the brake position (P).

When it is vibrated on the spot, the vibration will be switched off after 30 seconds automatically. For restarting the vibration, it is necessary to drive the machine by 8 metres.

Travel and reversing of the machine on a slope

- Always drive on a slope and select the speed considering your safety, slope gradient and adhesive conditions.
- When driving on a slope and under low adhesion conditions, enable the ATC differential lock function if it is installed in the machine.
- When driving uphill, adjust the speed of the machine so that the machine can drive up the slope.
- When driving downhill, select the speed gear and the driving speed at which the machine can or could drive up the slope.
- Do not use the transport speed on a slope with a gradient higher than 20%.
- On a slope with a gradient higher than 20%, always drive uphill with the drum and downhill with the wheels.



- Use the vibration on a slope only when driving with the drum uphill.
- When driving downhill, the vibration is allowed up to the gradient of 15%.

It is forbidden to vibrate when driving downhill on a slope with a gradient higher than 15%.

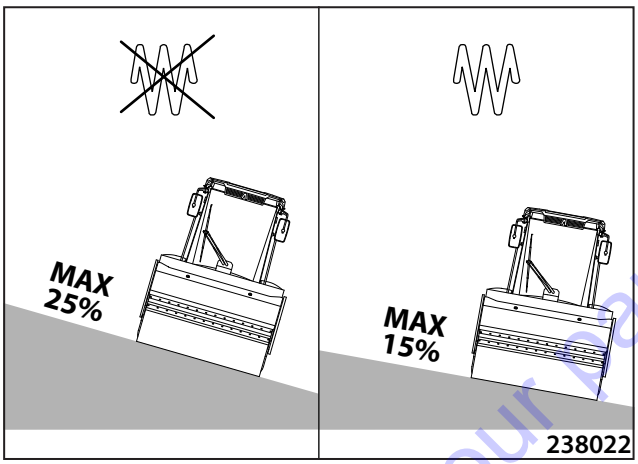
It is forbidden to drive downhill at the transport speed on a slope with a gradient higher than 20%.

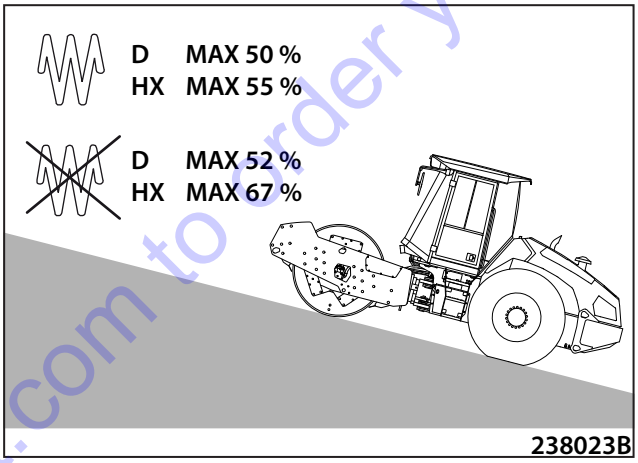
It is forbidden to abruptly change the driving direction (reverse) when driving on a slope.

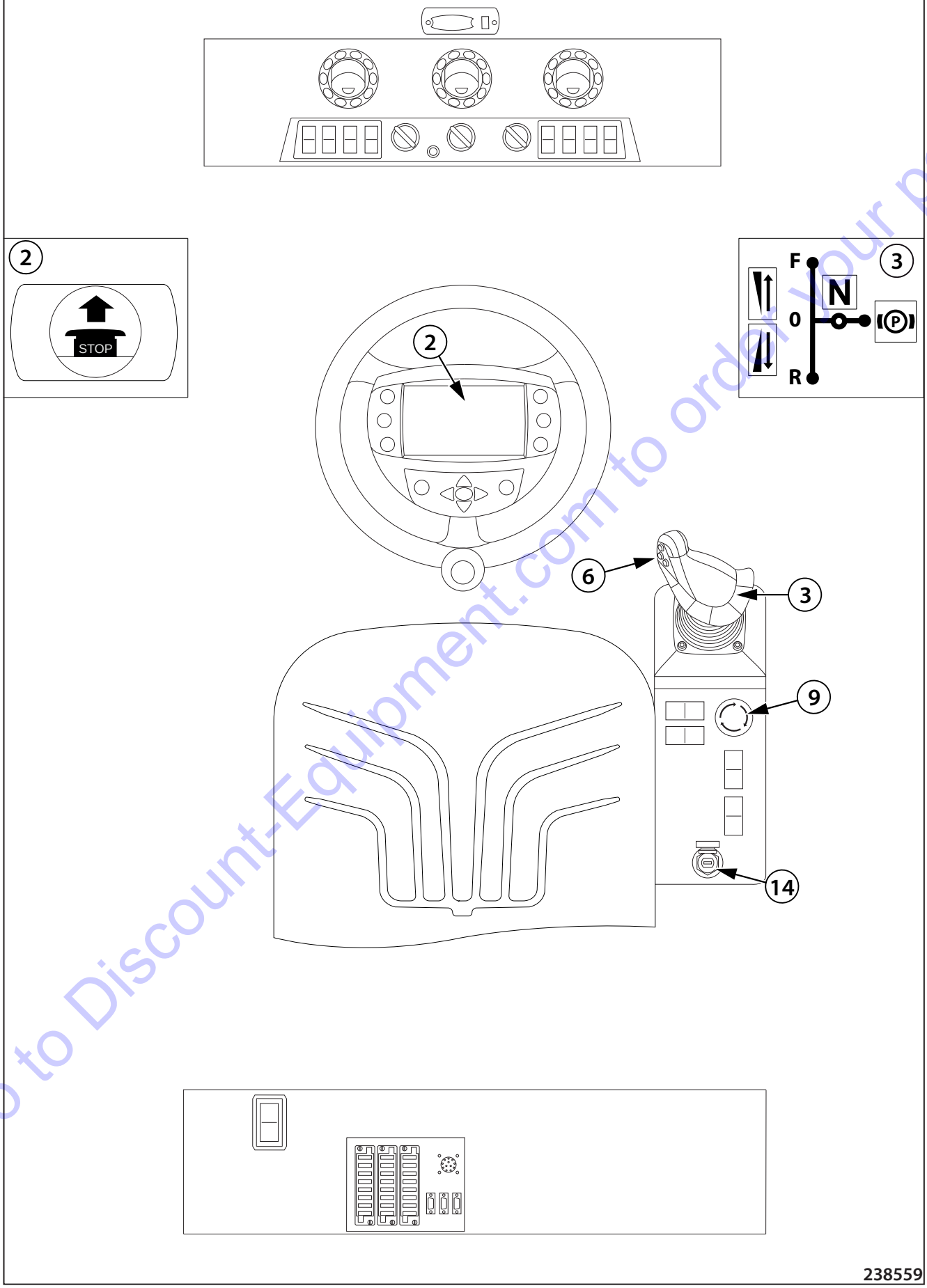
The maximum downhill driving speed is allowed to be the speed at which the machine can or could drive up the slope.

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!







2.7.3 Stopping the machine and engine

- Press the button (6) on the travel control (3) to switch off the vibration.
- Stop the machine by changing the travel control (3) to the neutral position (N).
- Brake the machine by changing the travel control (3) to the brake position (P).
- Turn the key in the ignition box (14) to position "0" and close the cap of the ignition box.

Do not stop the hot engine instantly but let it idle for 3 minutes. The engine and the turbocharger will cool down slowly and evenly!

The travel control (3) must be always in the brake position (P)!

Turn off the battery disconnector when shutting down the machine!

2.7.4 Machine emergency stop

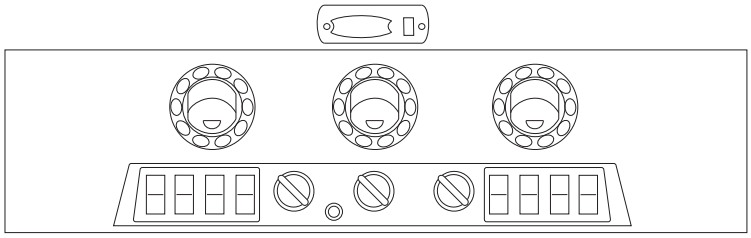
Use in a dangerous situation when you cannot stop the machine by enabling the panic response or by moving the travel control (3) to the brake position (P) or if there is a failure when it is impossible to stop the engine with the key in the ignition box!

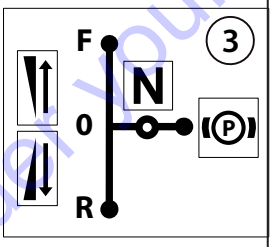
Turning on:

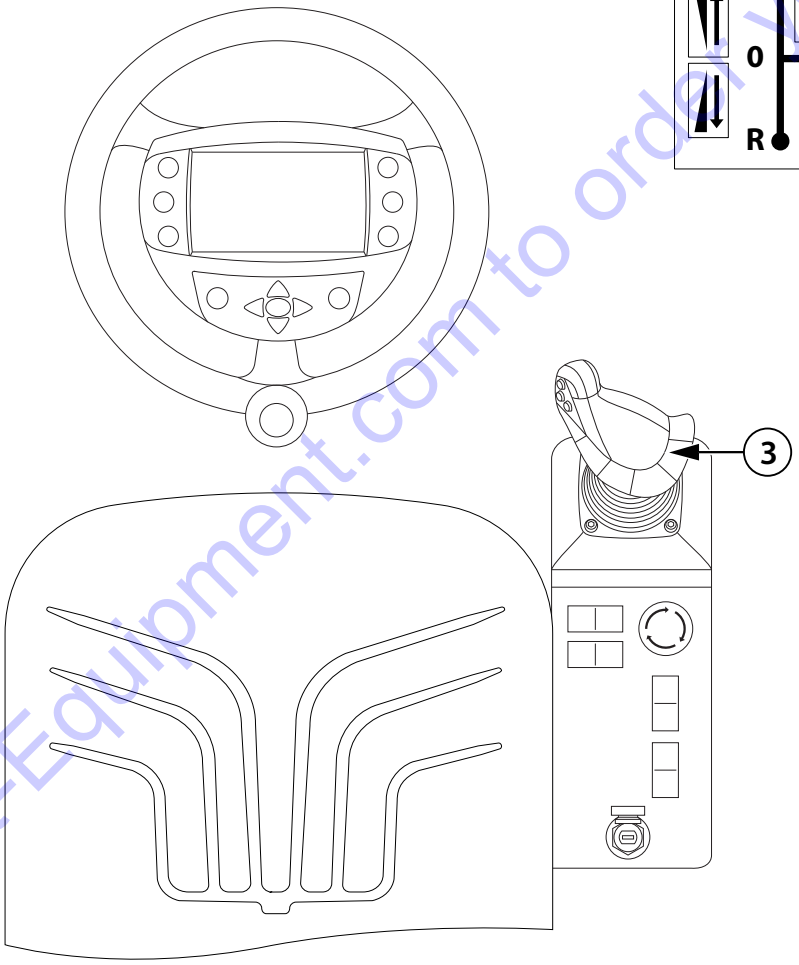
- After pressing the emergency brake button (9), the machine is braked and the engine stops.
- The emergency brake indicator lamp lights up on the display (2).

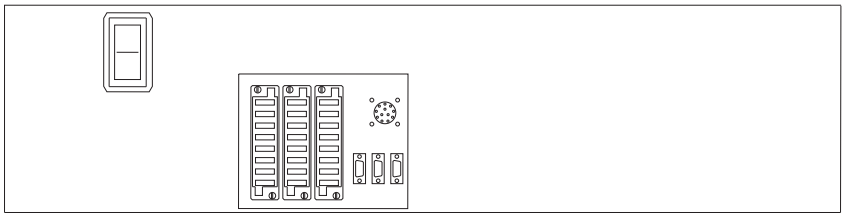
Turning off:

- Turn the emergency brake button (9) in the direction of arrows.
- The emergency brake indicator lamp will go off.
- The parking brake indicator lamp keeps lighting on the display.
- Move the travel control (3) to the position (P); you can restart the engine in this position.









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2.7.5 Panic response

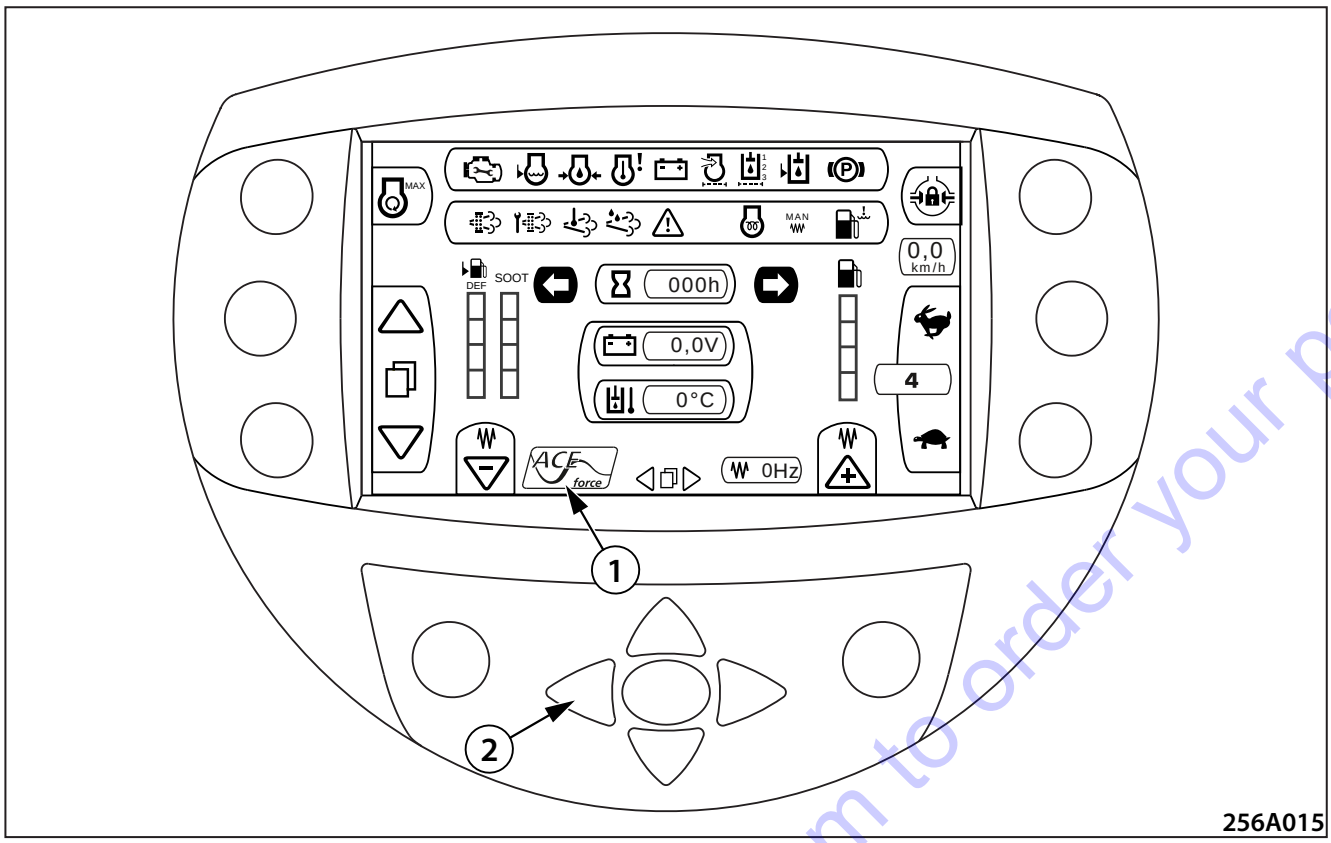
- The immediate stop of the machine using the travel control (3) applies to all of the travel modes of the machine. When the travel control (3) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be enabled, the engine will keep running, i.e. panic response. The machine can start moving again after the travel control (3) is changed to the brake position (P) and the travel direction (F/R) is selected.
- When the machine vibration is on, the vibration will stop also when the manual vibration mode is selected.

The manufacturer does not recommend that the panic response is used to stop the machine normally. Enable the panic response only in emergency when the machine must be stopped immediately.

2.7.6 Machine parking

- Park the machine on a flat and solid surface where there is no potential natural hazard (landslides, flooding, etc.).
- Change the travel control (3) to the brake position (P).
- After stopping the engine, turn off the battery disconnector before leaving the machine.
- Clean the machine (scrapers and drums).
- Check the whole machine and repair defects that occurred during operation.
- Lock the covers and cab of the machine.

Do not stop the hot engine instantly but let it idle for 3 minutes. The engine and the turbocharger will cool down slowly and evenly!

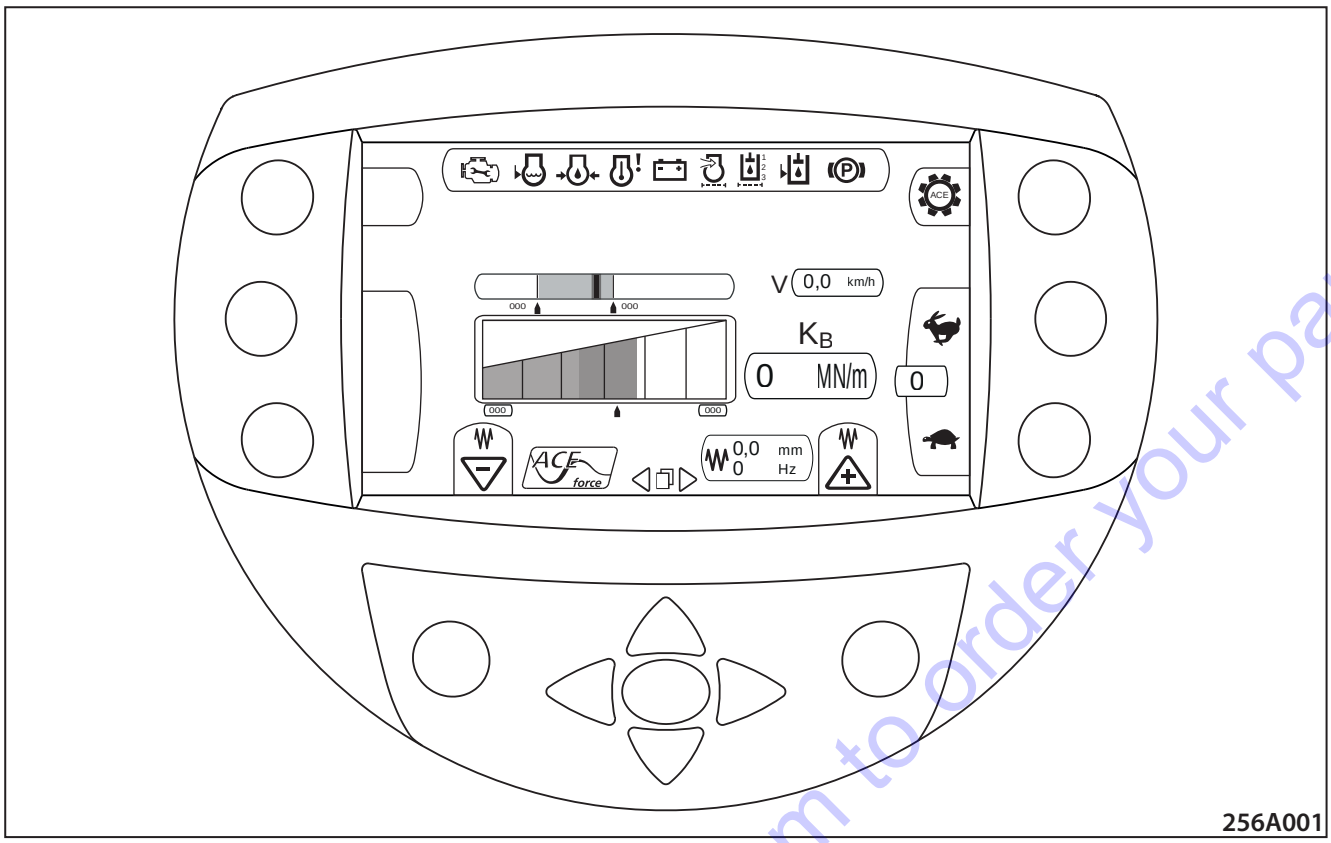


2.7.7 ACE Force

2.7.7.1 Entering the ACE Force screen

If the machine is equipped with the ACE Force system, the logo of ACE Force (1) is present on the main screen of the display.

For enter the ACE Force use left button (2) on the display.



2.7.7.2 Operation screen

Operational screen of ACE Force is located as a fourth page in machine's display. The functionality of ACE Force is operated automatically, without necessity of presetting. System is activated by start of the vibration and deactivated by stop of the vibration. System shows following values and information:

Parameter	Value
Kb	MN/m
Amplitude	mm (in)
Frequency of vibration	Hz (VPM)
Speed	km/h (mph)


AMN47

Engine failure indicator lamp


AMN48

Coolant level indicator lamp


AMN113

Engine lubrication indicator lamp


AMN50

Engine overheating indicator lamp


2777

Battery charging indicator lamp


AMN51

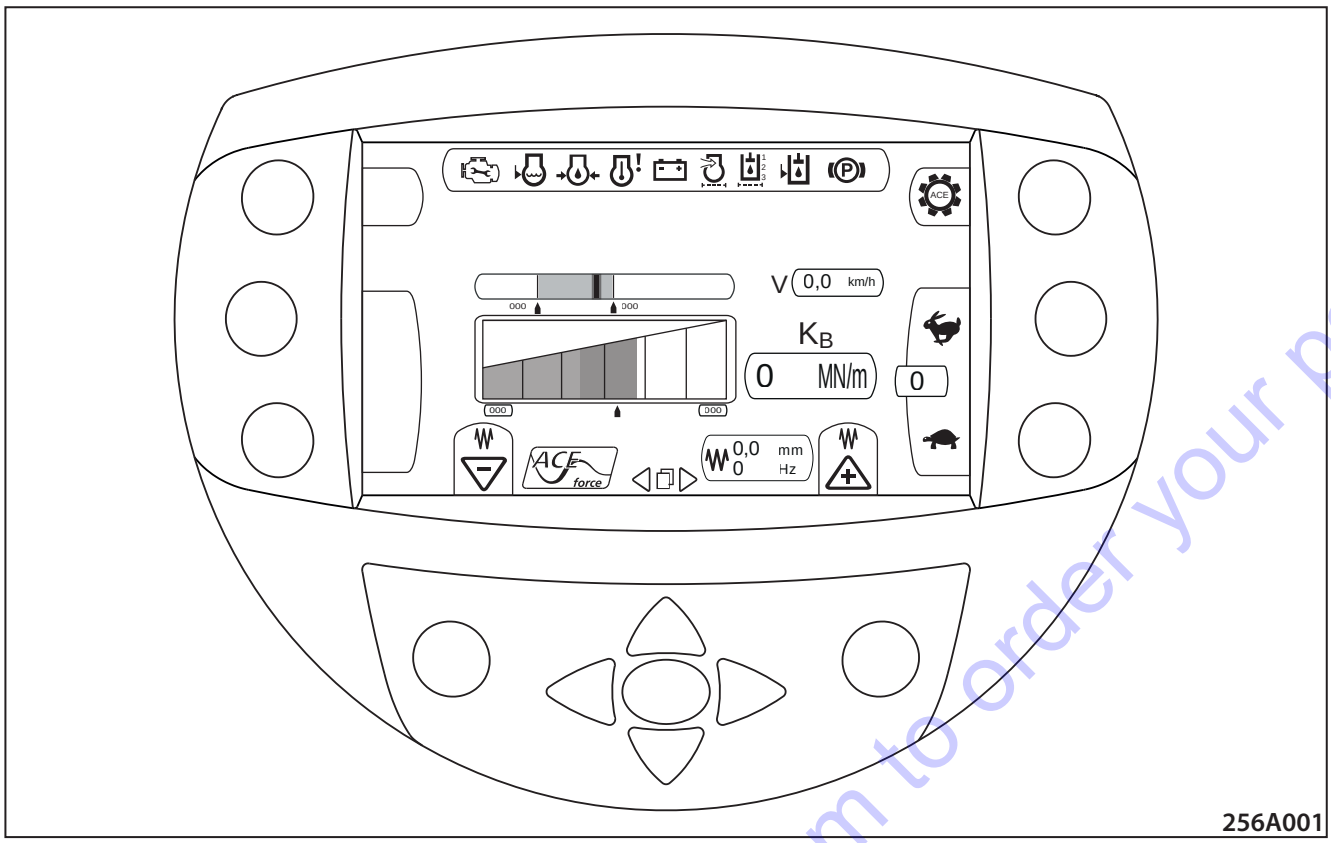
Air filter clogging indicator lamp


595427

Indicator lamp of hydraulic oil filter clogging

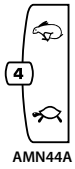

591507

Indicator lamp of hydraulic oil level



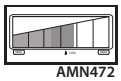

AMN42 AMN43

Vibration frequency buttons


AMN44A

Speed gear indicator

The ACE system functions are enabled only within the range of the working speeds 1–3/4.


AMN472

Graphical indicator of the degree of compaction

It displays an increment of Kb units during the compaction process.

If the function is enabled, it is a part of the indicator showing the required Kb value.

The range of values of the indicator of the degree of compaction can be set on the screen for setting parameters.


AMN464

Indicator of the degree of compaction

It shows a present value of the degree of compaction Kb in MN/m units.


AMN465

Parameters setting screen button

After the button is pressed, the ACE system parameters setting screen will appear.

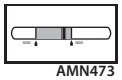

2612

Vibration setting indicator

The pictogram shows the (low/high) vibration amplitude setting.

Amplitude - value in mm

Frequency - preset value in Hz


AMN473

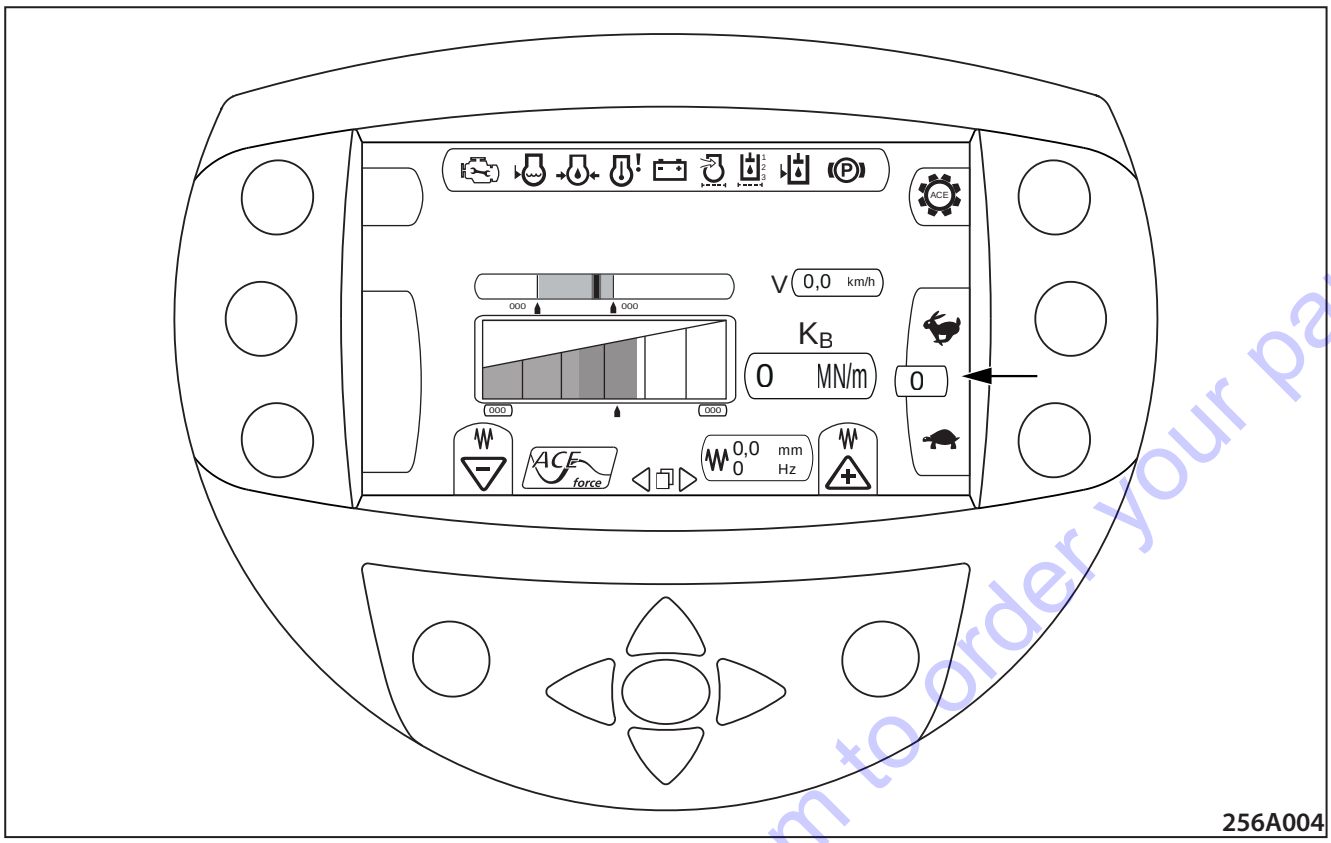
Graphical indicator of the required speed range

The range of required speeds is automatically calculated depending on the set frequency.


AMN466

Momentary speed indicator

It shows the momentary speed of the machine.



2.7.7.3 Speed selection

ACE Force system is activated via start of the vibration.

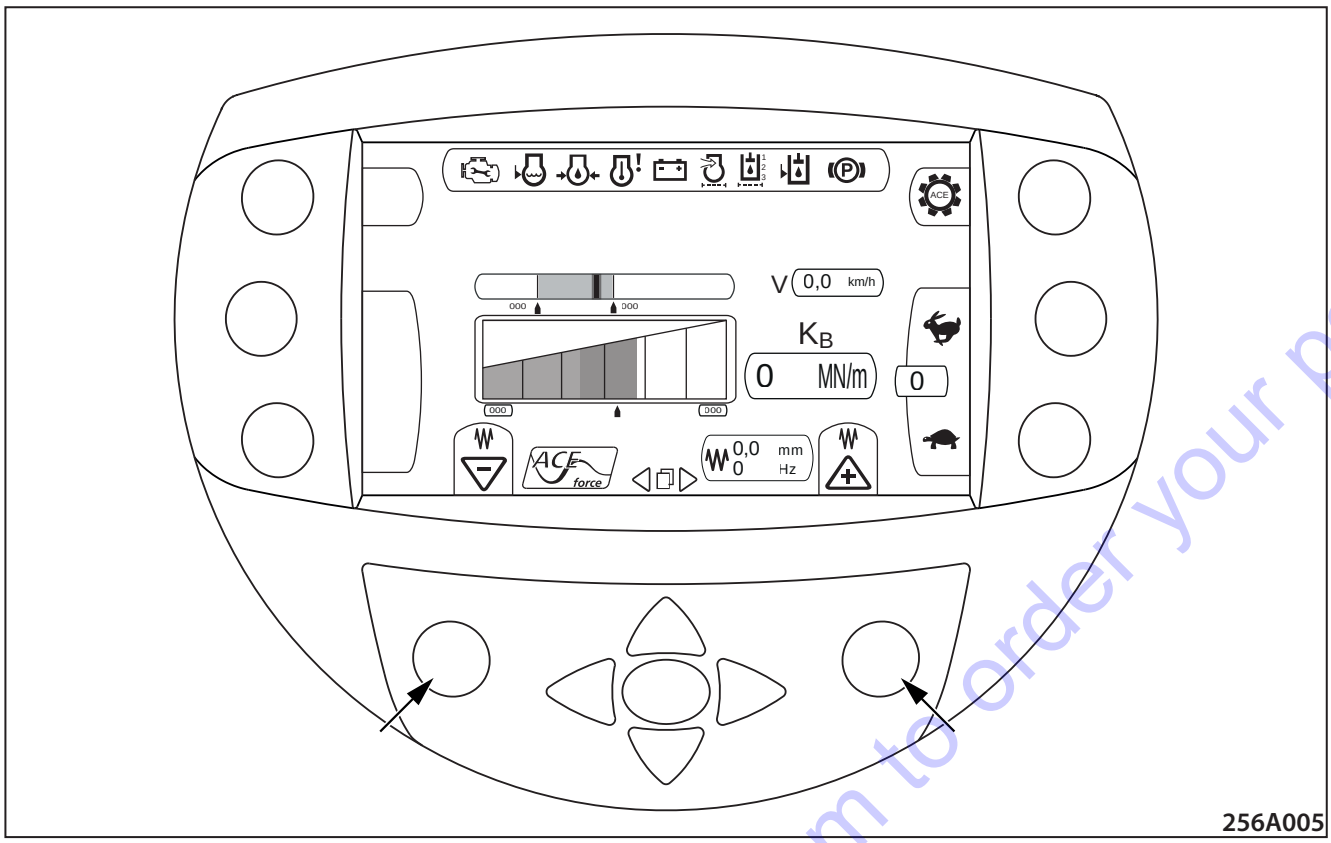
ACE Force functions (Kb graph bar, speed recommendation function, frequency/amplitude info bar, will be active only in working speed selection (speed 1 - 3/4).

Note

If transportation mode or loading mode speed will be selected, ACE functions/bars are inactive.

ACE Force functions are active in working speed range according to the table below.

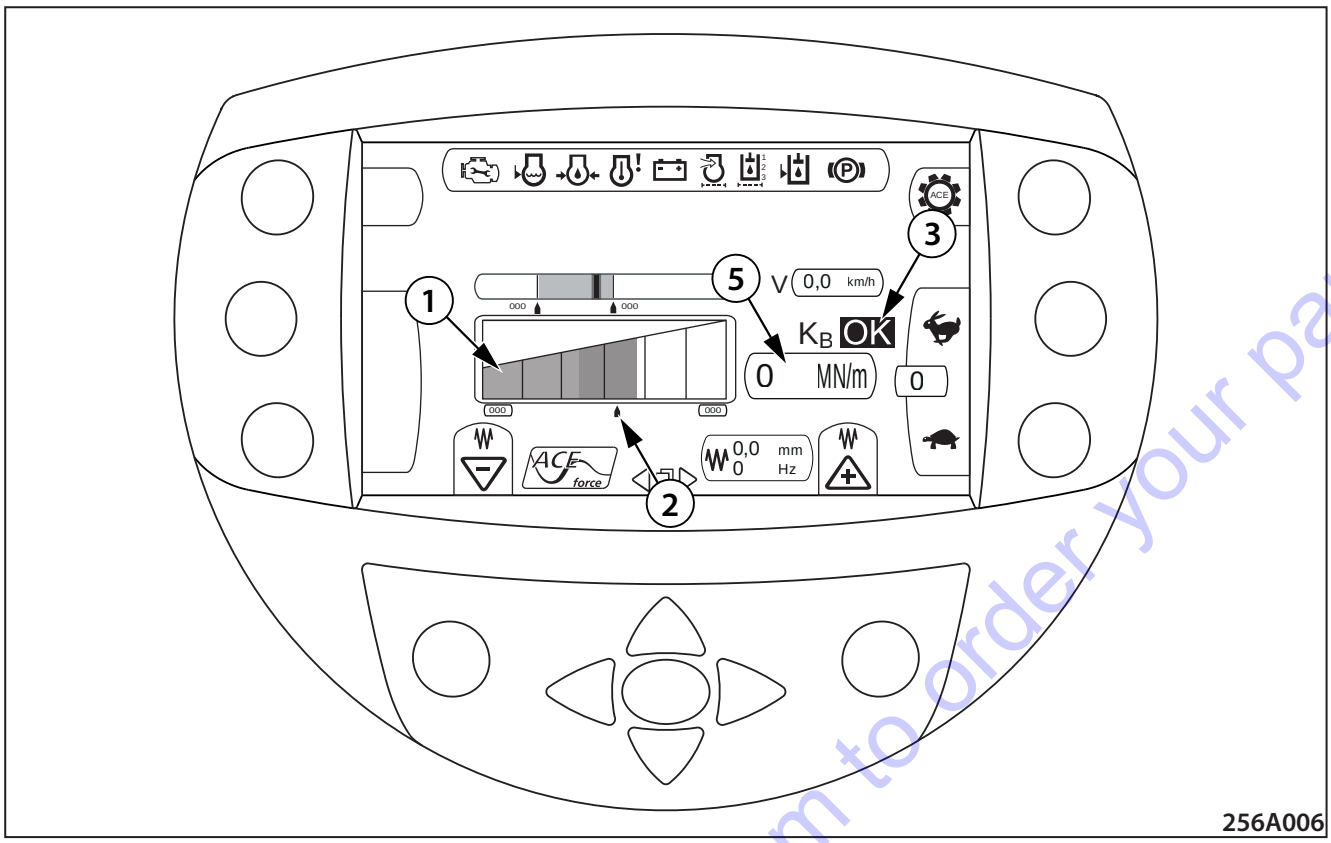
Machine	Drive	Working speed range
ARS 110	D	1 - 4
	HX	1 - 3



2.7.7.4 Frequency setup

Functionality will be the same as on first controlling screen of machine.

In case of bouncing of drum, change frequency setup. (increase/ decrease frequency) till the machine behaviour stabilize).



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2.7.7.5 Kb measurement

Visualization of Kb value, is divided to two section:

Graph bar with triangle visualization (1).

Graph bar providing graphic information of Kb value during compaction process.

As a part of this graph is visualization of Target Kb value (2).

If Kb target value is reached, visual signal "OK" (3) appears on the display. Then operator can proceed on the next track.

Setting of the target value is located on ACE Force setting screen (4).

Triangle bar has two colours zones, green one shows actual Kb value, the orange one shows the maximum Kb value reached from activation of vibration. This maximum Kb value is reset 5 seconds after vibration stop.

Range of graph bar, i.e. value on right end of bar can be set on the ACE Force setting screen.

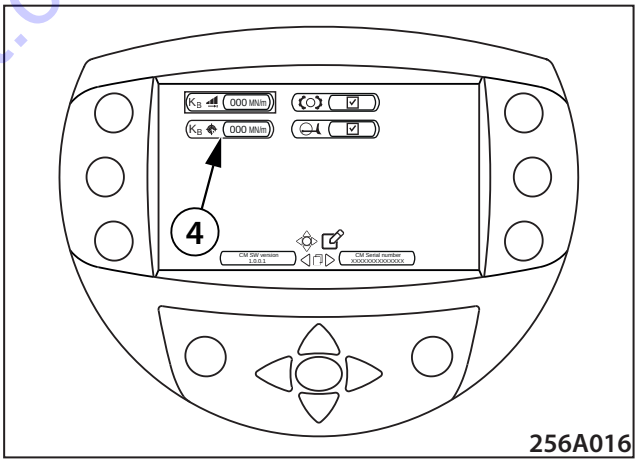
Numerical Kb value visualization (5).

This value showing actual value of Kb in MN/m.

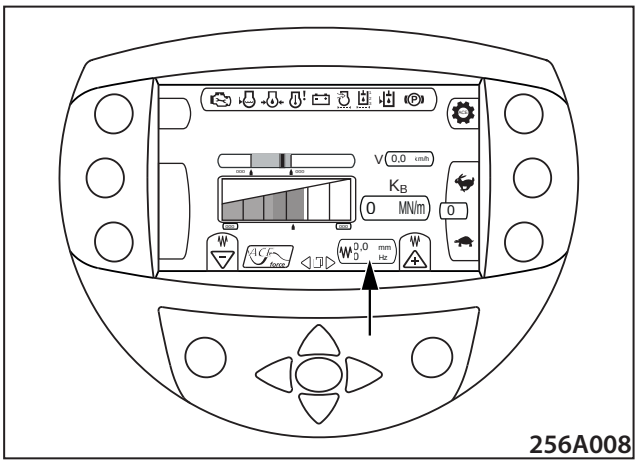
Numeric values:

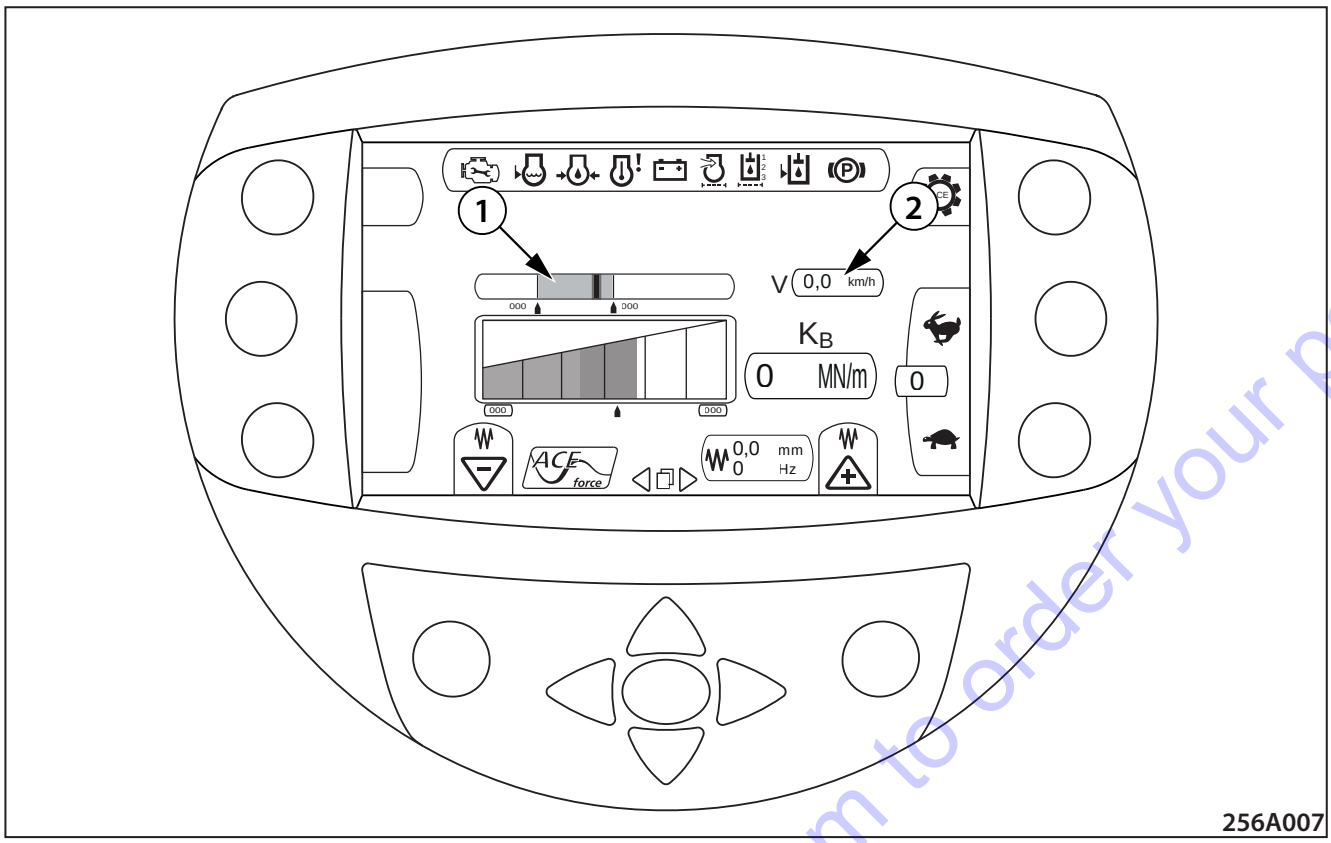
Amplitude - Actual, measured, value of amplitude in mm.

Frequency - Preselected value of frequency.



256A016

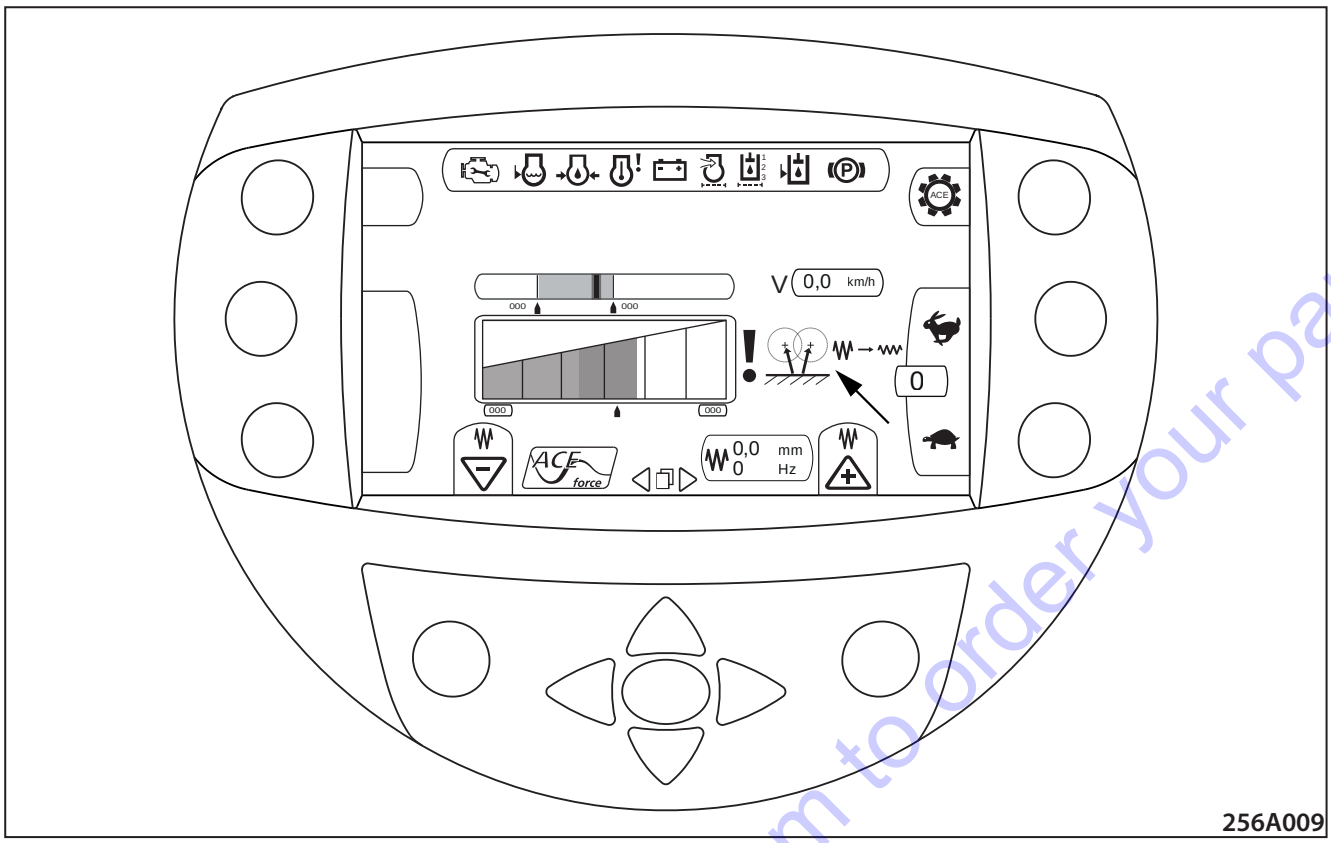

256A008



2.7.7.6 Speed range visualization

Information about the actual and recommended working speed of the machine is shown on the speed bar. On right side of speed range bar is numerical value that shows actual value of the machine speed.

- Optimum speed range is calculated from preselected frequency (1).
- Speed should be kept in the recommended range for optimal compaction energy delivery.
- Actual speed is shown in bar (2).



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2.7.7.7 Double jump warning and operator guidance

Visual warning

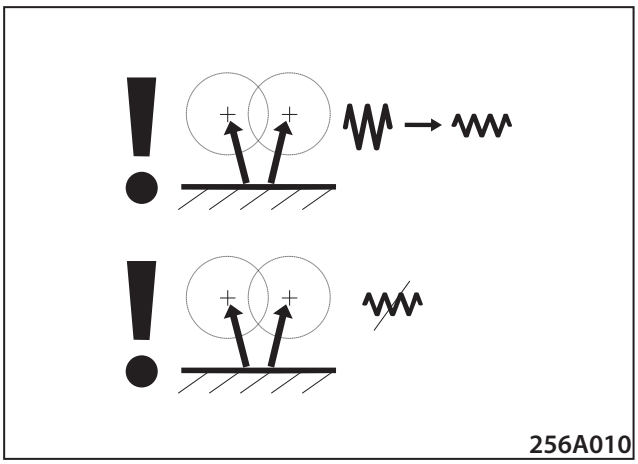
This function is passive , means no action to functionality of machine.

In case that CM measure&calculate the double jump of drum, the warning message and recommendation operation description will appear instead of Kb value visualization window.

There are two different warning messages:

1 If a big amplitude is selected – message guide to change a big amplitude to small amplitude

2 If a small amplitude is selected – message guide to switch off vibration



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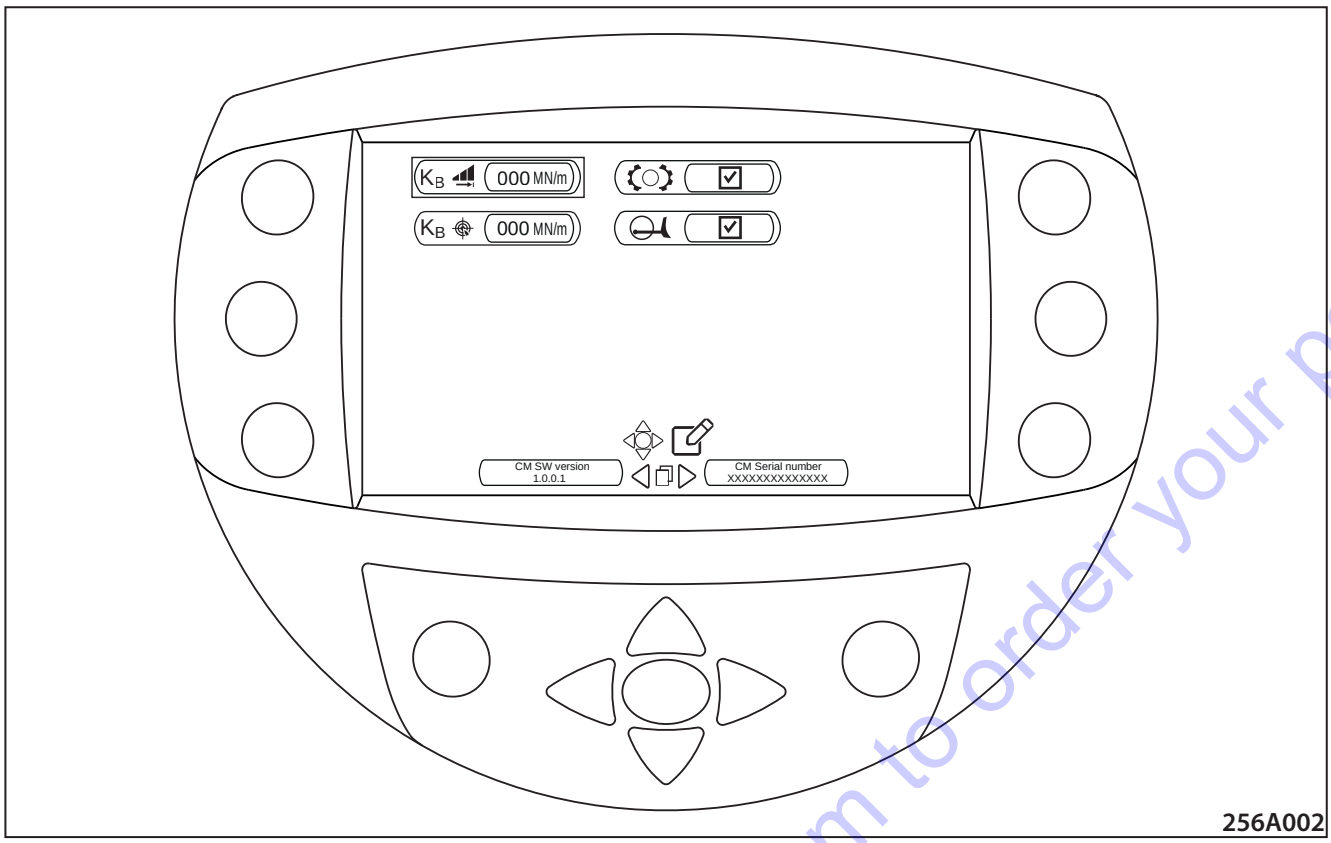
Deactivation of warning

Warning message and warning signal will be active till the CM identify end of double jump or if the operator switch off the vibration.



2.7.7.8 ACE parameter screen

On this screen parameters for ACE system are shown and can be edited. Red rectangle is cursor, with up/down buttons can user move with this cursor. After pressing “enter” button, cursor will start blinking and value can be changed by up/down buttons. After change of the requested value, user confirm by pressing “enter” button. Both left and right button are for returning to main screen.

Parameters:

Max value of KB range

Target KB value

PD shells option (selected if option is equipped)

Blade option (selected if option is equipped)

Note

PD shells and blade options has an influence on the accuracy of the Kb value calculation, therefore it must be selected accordingly to the machine real configuration.

On bottom part of the screen is also compaction module SW version and serial number.

2.7.7.9 Recognition of compaction value achievement and the status against the target

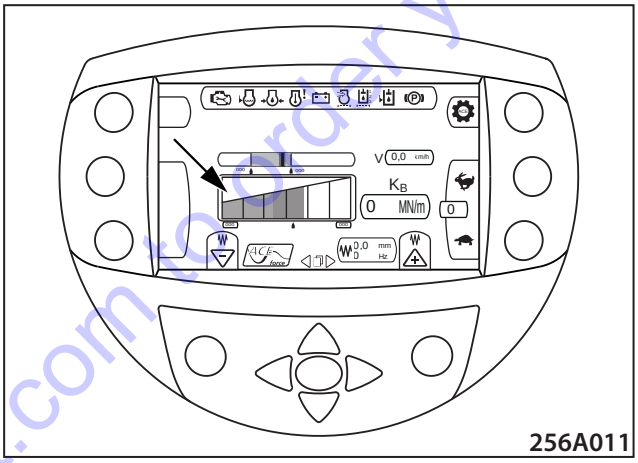
Methods of the recognition of an increase in compaction and the achievement of the maximum degree of compaction:

- evaluation of compaction by means of absolute Kb value (MN/m),
- evaluation of compaction by means of a drum jump.

2.7.7.10 Evaluation of compaction by means of Kb value

The value kB defines the instantaneous stiffness of the material under the compacting element, i.e. a drum.

This parameter is measured continuously by means of assessing the compaction energy transferred into the material.



If the value of the Kb value does not increase in three consequent travels in the same compacted track, the material is compacted to the maximum level of compaction with the given machine.

Note

If the achieved degree of compaction is not sufficient (as compared to laboratory tests), in order to achieve a higher degree of compaction, it is necessary to use a machine of a higher weight category or to check the compactibility of a higher compaction output.

2.7.7.11 Evaluation of compaction by means of a drum jump

A drum jump is the limit state of the compaction process where the material stiffness increases and which results in a drum jump. This state can be used to determine the maximum degree of compaction.

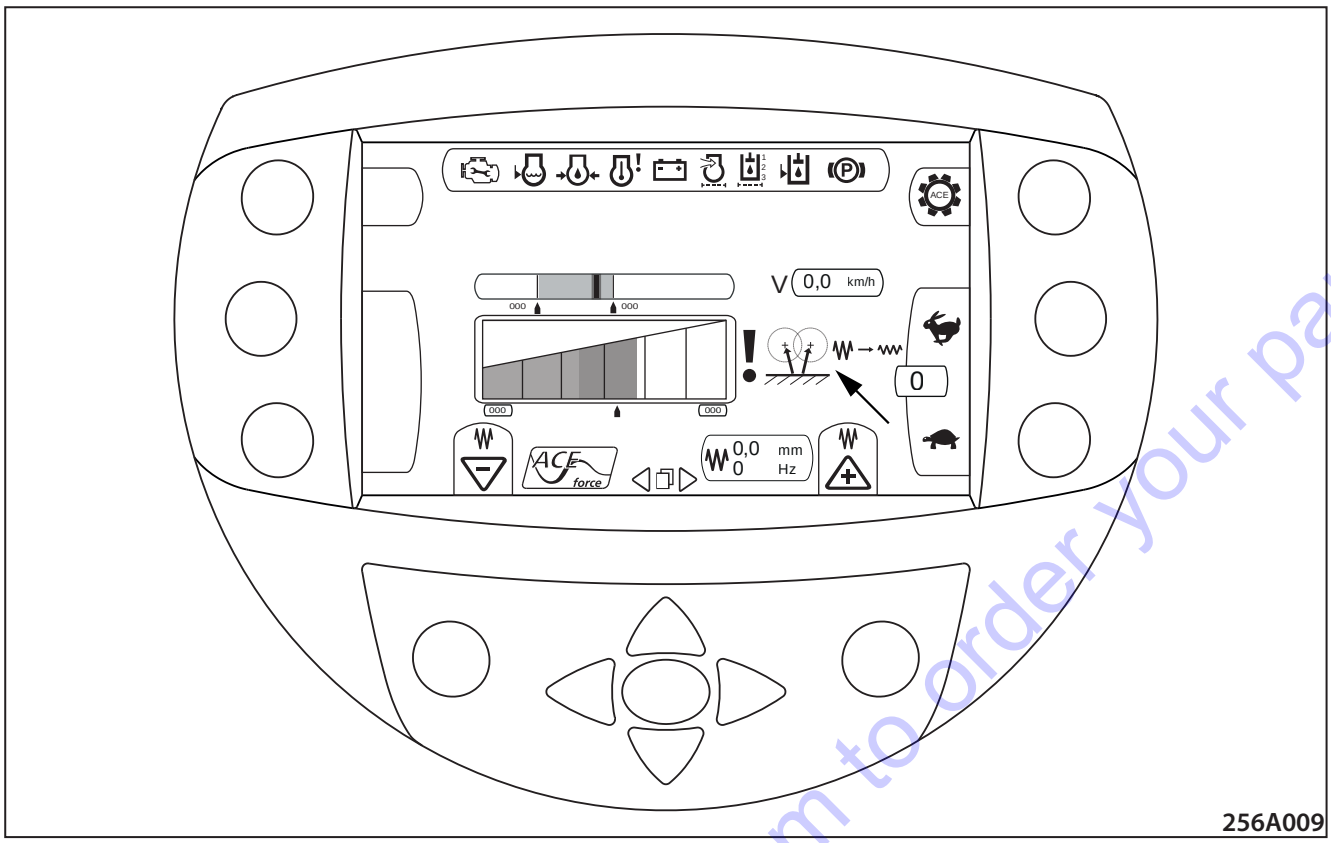
2.7.7.12 Periodic (single) jump

If the value of material compaction increases, the so-called drum periodic jump may occur. The drum periodic jump is characterised by one drum jump per one finished amplitude of the drum (one drum exciter revolution).

The ACE FORCE display unit indicates this condition by the icon in the status field of vibration.

The drum periodic jump is technologically the most suitable condition for compaction.

The drum has highest compaction effect when working in periodic jump.



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2.7.7.13 Double (chaotic) jump

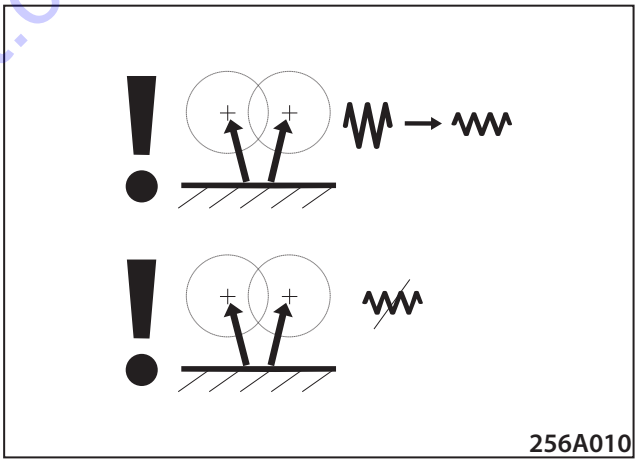
A drum double jump occurs when the value of material stiffness exceeds the applicable compaction compaction energy of the compaction element, i.e. the drum.

In case of a double jump, the drum jumps by more than one finished drum amplitude (two drum exciter revolutions).

The double jump of the drum is a potentially dangerous condition which may cause damage to the machine, eventually the compacted material. Therefore, when such condition occurs, the vibration should change over to low amplitude (when using high amplitude) or the machine vibration should be turned off (when low amplitude is set). Frequency change can also influence this mode occurence.

A double jump is an indication of the achievement of the maximum degree of compaction by the machine.

The ACE FORCE display unit indicates this condition by the icon.



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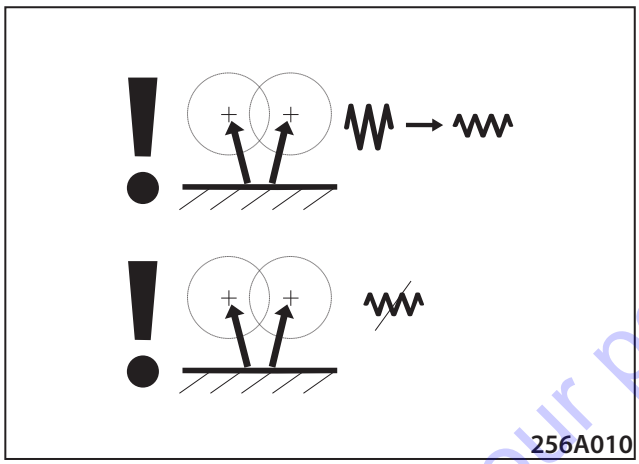
Note

If the achieved degree of compaction is not sufficient (as compared to laboratory tests), in order to achieve a higher degree of compaction, it is necessary to use a machine of a higher weight category or to check the compactibility of the material with an accredited laboratory

Recommendation in case of double drum rebound

If there is a double jump of the drum, the following appears on the display unit:

Should high amplitude be preset, it recommends changing over to low amplitude.



Should low amplitude be set, it recommends turning off the vibration.

2.7.7.14 General fault

General fault of the ACE Force system

Compaction module hardware error

Hardware failure, check harness and cables, check indication LED on compaction module.

Parameter error

Either machine is not calibrated or there are invalid parameters.

In case the error code is shown on the screen, contact Ammann dealer or customer support!

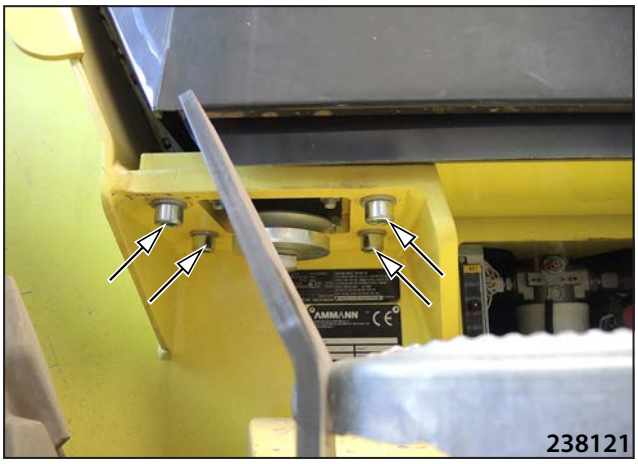
2.7.8 Cab lifting and lowering

Lifting, lowering and holding the cab or platform in the lifted position must be done only when the cab or platform is empty.

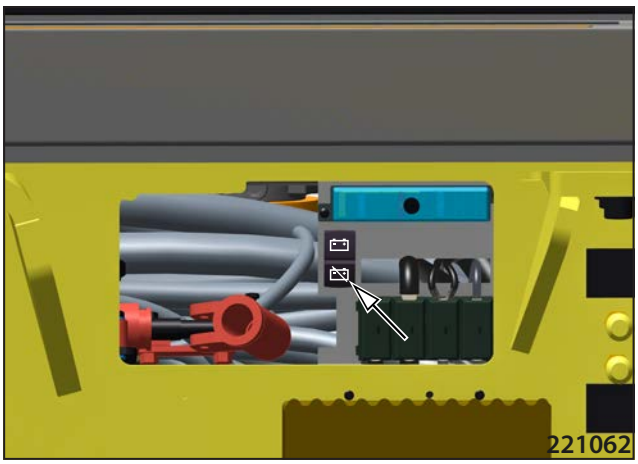
It is forbidden to lift the cab on a slope (in the downhill direction) with an inclination higher than 18 %! There is a risk of serious injury or death!

Before lifting the driver's stand at the ROPS machines, lower the backrest and the armrest of the seat.

- Before lifting off, unlock the cab.



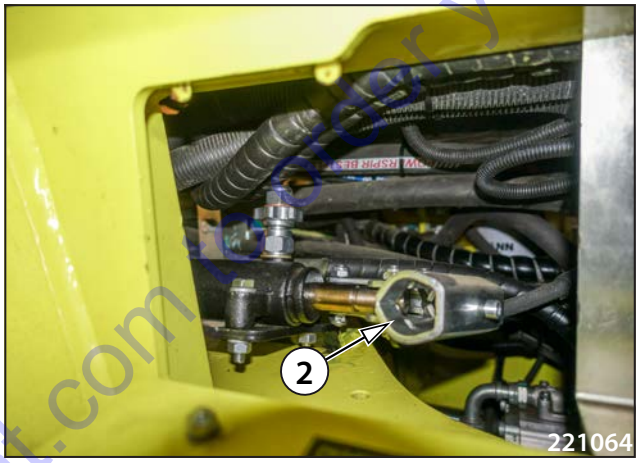
- Connect the electrical installation using the disconnector switch.



Lifting

- Tighten the valve on the cab lifting pump.

- Insert the lever (2) into the pump and lift the cab by pumping.
- Pump using the lever in the manual hydroelectric generator with 80 full strokes at least.

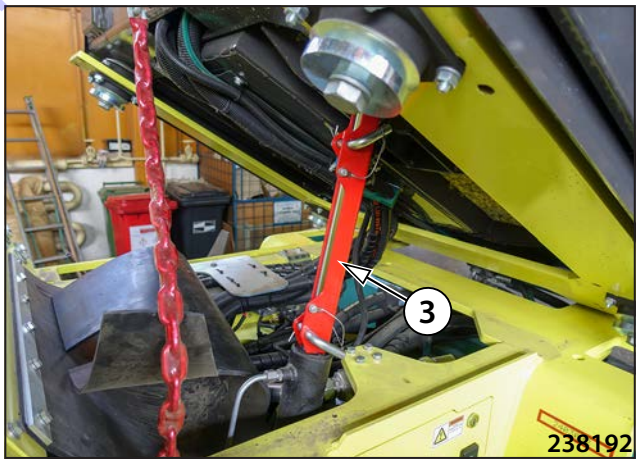


- Secure the cab with the strut (3).

The strut is dimensioned to support an empty cab without the driver.

Screw on the driver's stand (cab) after the tilting!

Tightening torque 200 Nm (147.5 lb ft).

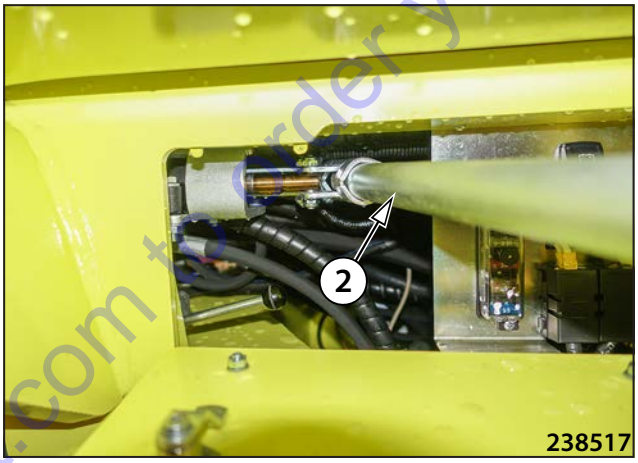


- Open the valve on the cab lifting pump.
- The cab rests on the strut.
- Close the valve on the cab lifting pump.

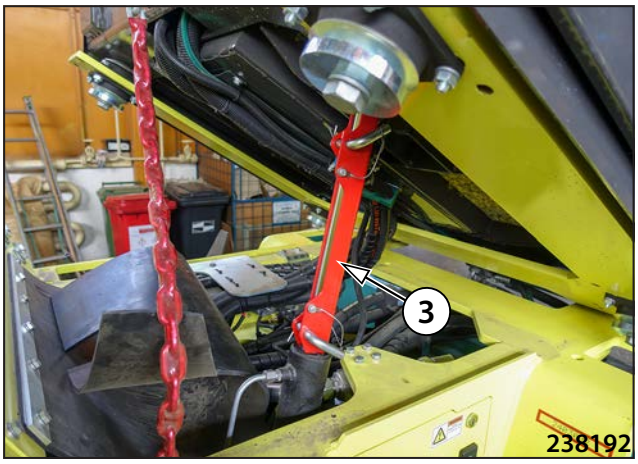
Lowering

- Close the valve on the cab lifting pump.

- Pump using the lever (2) in the manual hydroelectric generator to lift the cab off the strut.



- Remove the strut (3).



- Open the valve on the cab lifting pump to lower the cab.
- Leave the valve open.

2.7.9 Tyre ballasting with liquid

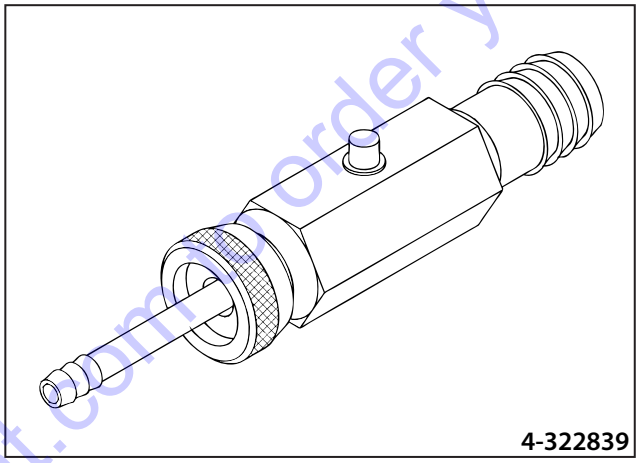
It is used for reducing the centre of gravity of the machine. The mixing ratios per tyre are shown in the table.

Tyre ballasting with liquid up to -25 °C

The tyre interior is filled with the solution of water and 34% calcium chloride CaCl2.

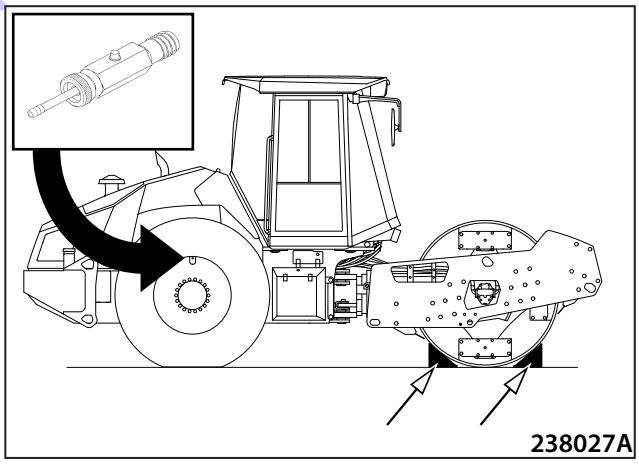
water	34% calcium chloride $CaCl_2$	additional weight
(l) [gal US]	(kg) [lb]	(kg) [lb]
185 (48.87)	414.7 (914.26)	600 (1323)

The filling adapter can be ordered as a spare part under the number 4-5325190009.

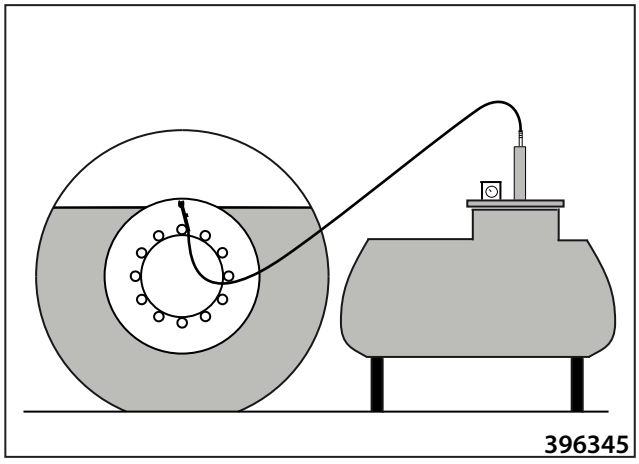


Filling process

- Place the machine on a solid and flat surface. Drive the machine with tyres on the surface so that the filling valve is in the highest position. Use scotch blocks to secure the drum from both sides.
- Unscrew the detachable insert of the valve and screw in the filler cap.

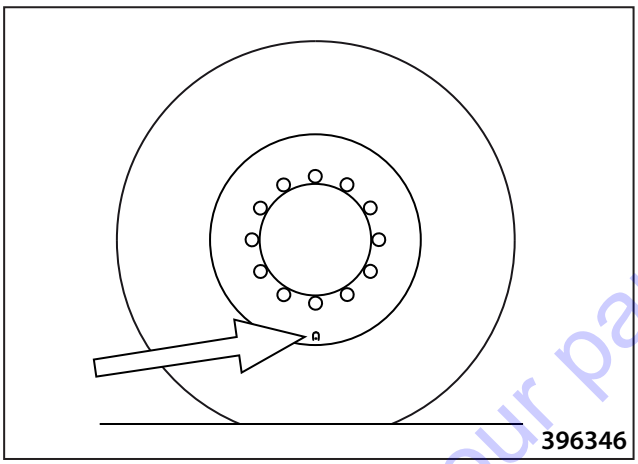


- Mount the hose from the filling device (upper vessel, pump, etc.) to the adapter and fill the tyres with the solution.
- During the filling, the air from the tyre leaks through the side opening from the filling adapter. The tyre is sufficiently filled (75%) when the solution starts to flow out from the opening.
- Unscrew the filling adapter, screw on the valve insert back and pump up the tyre to the pressure of 160 kPa (23.2 PSI).



Draining procedure:

- Place the machine on a solid and flat surface. Drive the machine with tyres onto the surface so that the filling valve is in the lowest position. Use scotch blocks to secure the drum from both sides.
- Unscrew the detachable valve insert and the solution will run out.



When you remove the valve insert, the solution may splash out.

- As soon as the pressure drops so much that almost no solution is running out, screw on the filling adapter and pump up the tyre to the pressure of 160 kPa (23.2 PSI).
- When the tyres are filled up, take out the filling adapter and screw on the valve insert back.

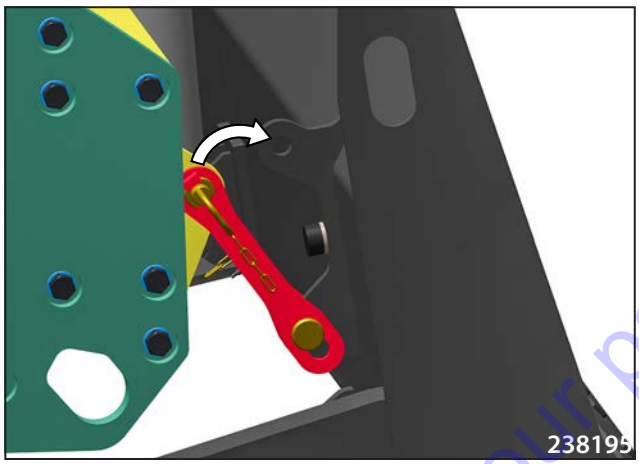
Protect your eyes with glasses (protective shield) and hands with rubber gloves!

Wash the spilt solution with clean water.

The solution must not come in contact with metal parts and the wiring.

2.7.10 Blade

Unlock the blade on both sides.

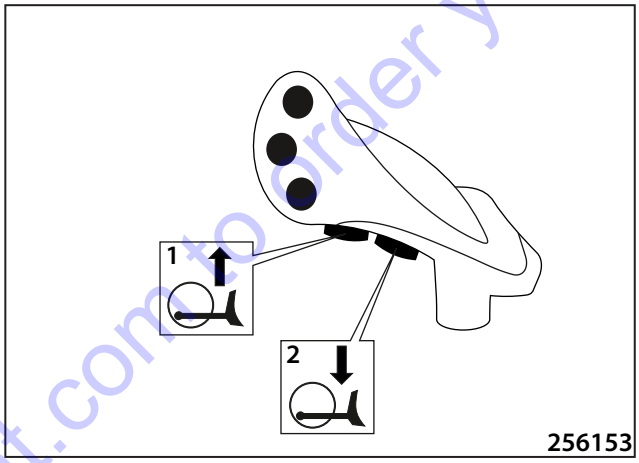


The blade is controlled using the buttons on the travel control.

Button 1 – blade – up

Button 2 – blade – down

While driving at the transport speed, it is allowed to move the blade only upwards.

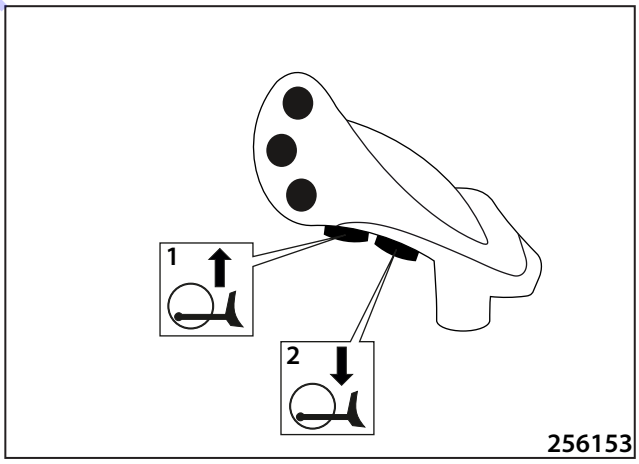


By pressing the buttons (1, 2) at the same time, the blade is placed to the floating position.

The blade will drop to the ground and copies the terrain while driving.

When the engine is switched off and the key is turned to the "I" position, the blade is allowed to float.

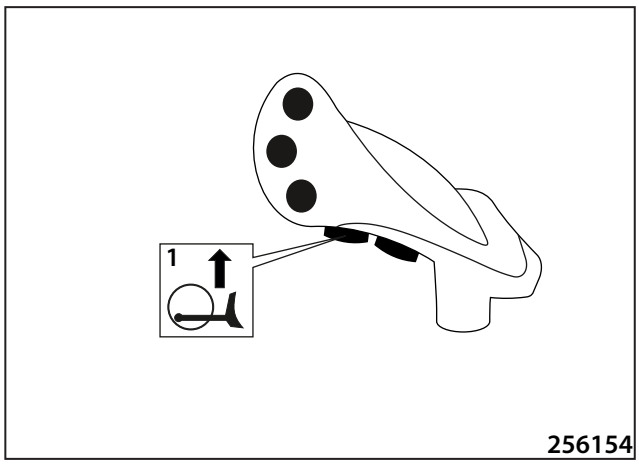
The floating position is only functional as long as the buttons (1, 2) are kept pressed down.



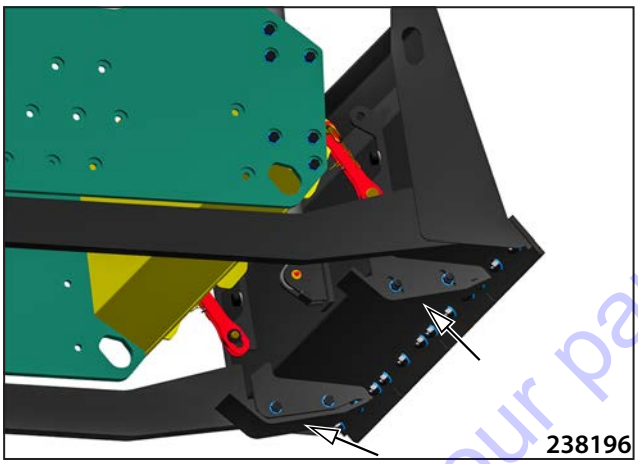
End the floating position using the blade – up button (1).

If you press the blade – down button in the floating position mode, the blade will move down. When the button is released, it activates the floating position again.

Read the size of the recess from the pointer on the blade.



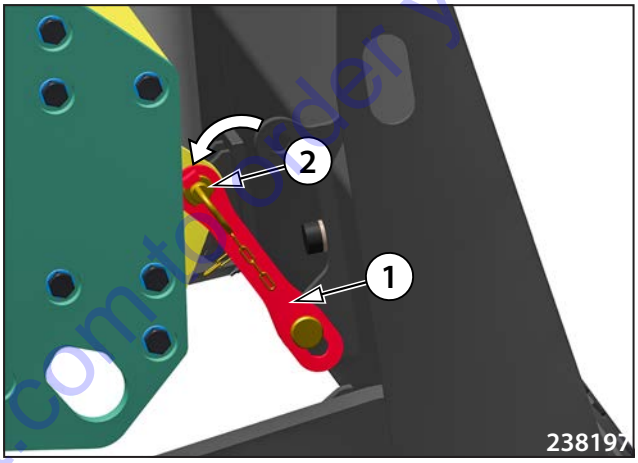
To push the material over a flat plane, you can use the floating positions of the blade. You can use the floating position also for redistributing and evening the spread material. The blade glides over the skids.



After finishing the work with the machine, the blade must always be locked at the terrain height or in its upper position using the locking connecting rods (1) and pins (2) on both sides.

Note

The blade edges are removable and if worn, you can turn them by 180°.



In the loading mode (speed gear 0), the blade can only be moved up and down. The floating position is blocked.

Do not adjust the scrapers and do not work on the blade unless it is lowered to the ground and the engine is stopped or the blade is locked by both safety connecting rods.

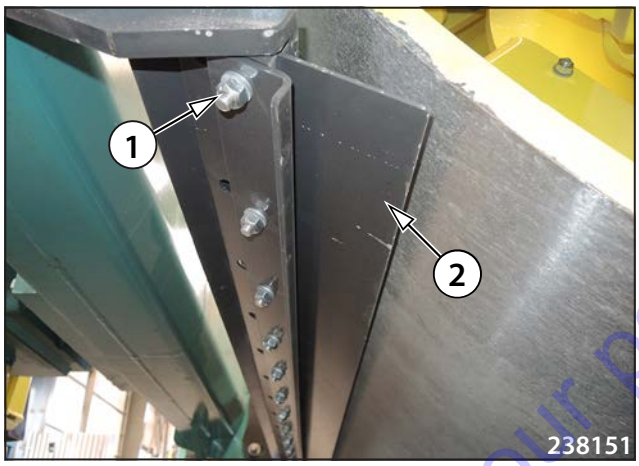
Do not work with the blade if it is locked.

There is a risk of damage to the blade if it is attached to one locking rod.

2.7.11 Scraper adjustment

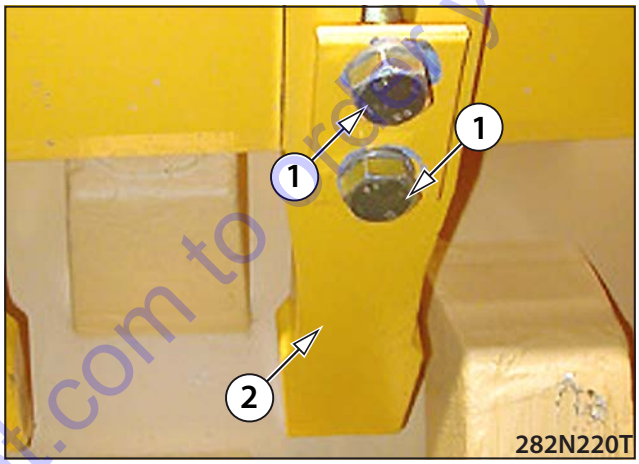
Scrapers for smooth drum

- Loosen the nuts (1) and move the scraper (2) to the drum at the distance of 20 mm (0.78 in) between the scraper and the drum.



Scrapers for pad-foot drum

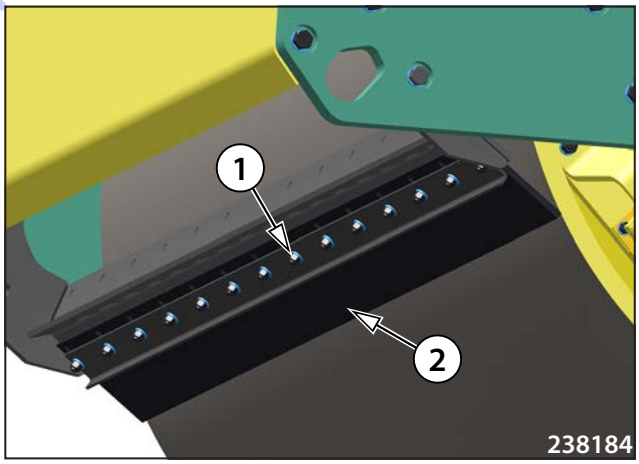
- Loosen the screws (1) and move the individual scrapers (2) to the drum at the distance of 35 mm (1.37 in).



If a small gap is adjusted between the scraper and the drum, the scraper can get in contact with the drum when the machine turns.

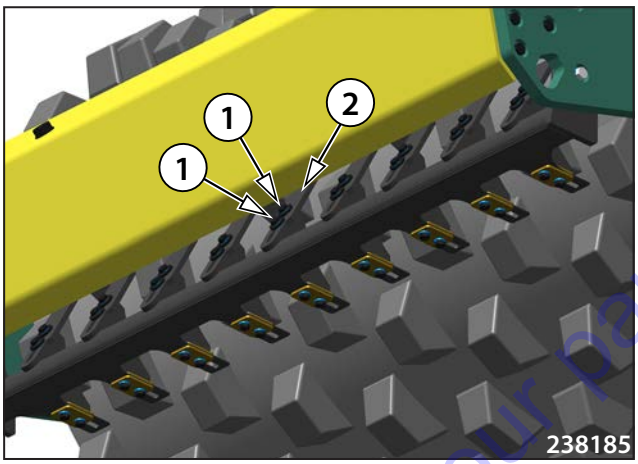
Contact scrapers

- Loosen the screws (1) and move the scraper (2) to the drum.

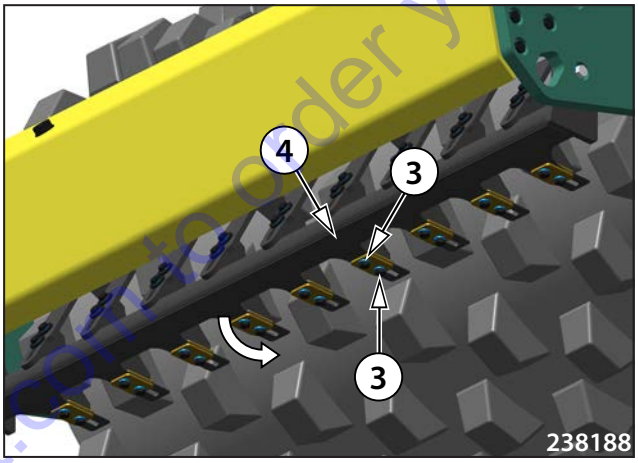


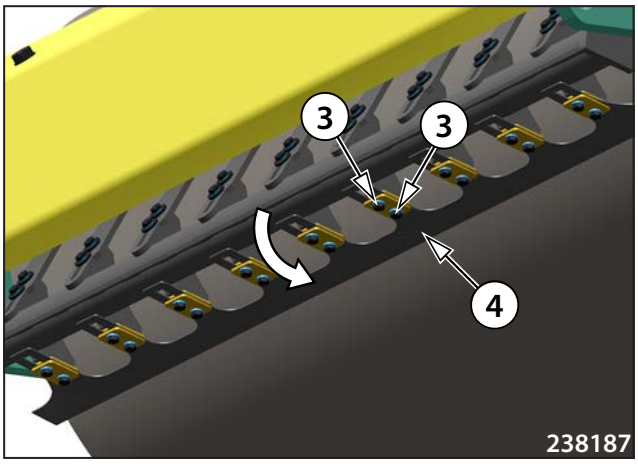
Combined scrapers

- Designed for a drum with padfoot segments.
- If padfoot segments are installed, turn the blade of the smooth scraper away from the drum.
- Loosen the screws (1) and move the individual scrapers (2) to the drum at the distance of 35 mm (1.37 in).



- If padfoot segments are not installed, remove the screws (3), turn the blade of the smooth scraper (4) towards the drum and move the scraper to a distance of 20 mm (0.78 in) between the scraper and the drum.





2.8 Machine transport

- The machine can move on its own between working sites.

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

When driving over long distances, stop every 30 minutes for an hour to let the machine cool down. By failing to do so you take the risk of damaging the machine, for which the manufacturer bears no responsibility.

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

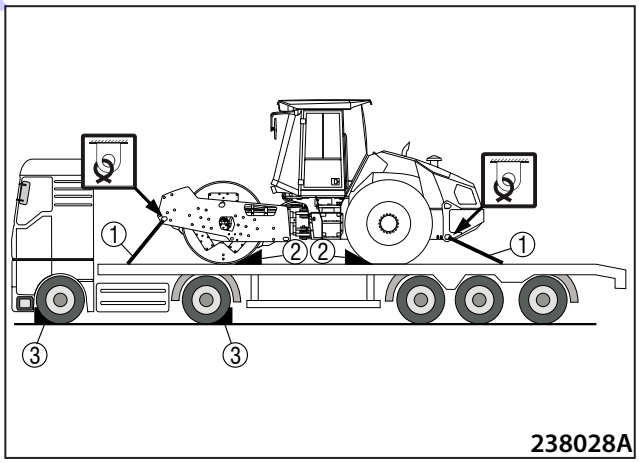
When transporting the machine on a vehicle, observe regulations applicable to the given territory.

When loading and unloading, the vehicle transporting the machine must be braked and mechanically protected against accidental movement using scotch blocks (3).

To load the machine, use the loading mode function (differential lock ON, speed gear 0). Working functions of the machine are locked (vibration). We recommend you to support the drum with rubber belts at the same time.

Place the machine on the mean of transport in the direction of travel (see Figure). If it is placed in the opposite direction, it is necessary to plug the engine intake before the transport.

The machine on the vehicle must be properly tied and mechanically secured against longitudinal and lateral displacement as well as against tilting (1). The wheels must be wedged with wedges (2).



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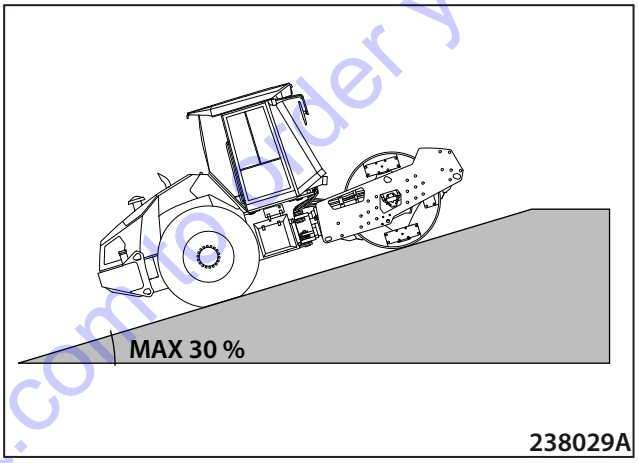
2.8.1 Loading the machine

- 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%.



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

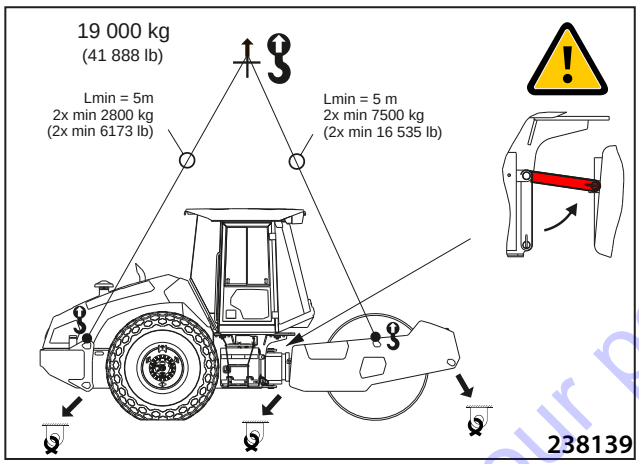
When loading the machine, another person must be present to give hand signals to the machine operator for driving on the ramp. See the list of hand signals in chapter 2.1.6.

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

To load the machine, use the loading mode function (differential lock ON, speed gear 0). Working functions of the machine are locked (vibration). We recommend you at the same time to support the drum with rubber belts or wooden boards, etc.

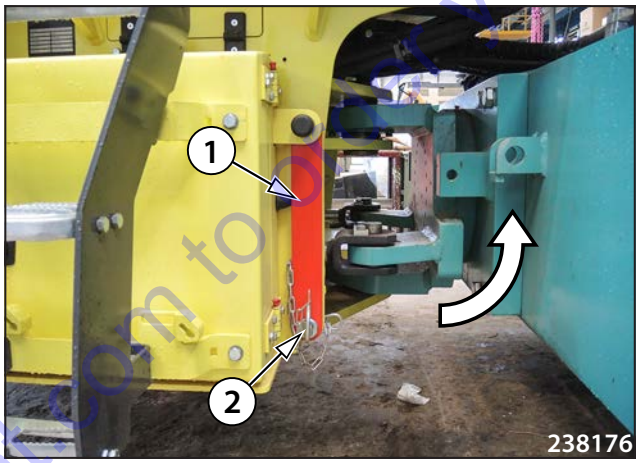
2.8.1.2 Loading the machine using a crane

- For loading with a crane, the roller is provided with lifting lugs.
- Before lifting the roller, the articulation joint of the machine must be locked against turning.



Locking the articulation joint:

- Lower the arm (1), secure with the safety pin (2).



Do not enter under the lifted load!

Before loading the machine using a crane, the articulation joint of the machine must be locked against turning!

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

When the loading is completed, return the safety arm to the starting position.

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

To sling, use only lifting lugs on the machine designed for that purpose.

Only a trained slinger may carry out the slinging.

2.9 Special conditions to use the machine

2.9.1 Safety function and emergency mode of the machine (limp mode)

The electronic system of the machine continuously diagnoses important systems. If a serious failure is diagnosed, the machine will stop, brake or stop the engine and the display will show a warning.

The emergency (limp) mode is used to move the machine from the construction site to a safe location to remove the fault. The emergency mode prevents the transport speed and limits some functions of the machine according to the type of fault.

When operating the machine in the emergency mode, use extreme caution, always taking into account the detected fault! The machine can behave unusually and unpredictably.

The machine shows warning symbols on the display when diagnosing a fault in important systems of the machine:

- Brake circuit.
- Machine speed sensor.
- Travel pump circuit.
- Brake block circuit.
- Emergency brake button circuit.
- Travel control circuit.
- Engine temperature.
- Hydraulic oil temperature.
- Hydraulic oil level.
- Machine power supply (fuses).

After detecting such an error, the machine stops.

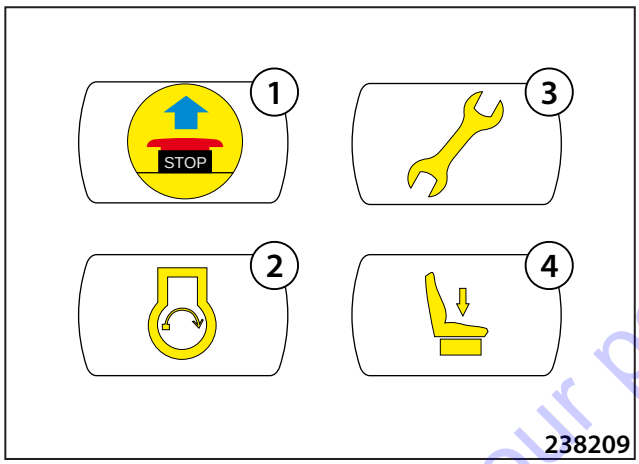
2.9.1.1 Symbols shown on the display

Emergency brake button pressed (1)

Conditions to start the engine are not met (2)

Service switch activated (3)

Detection of a driver on the seat (4)



General error (5)

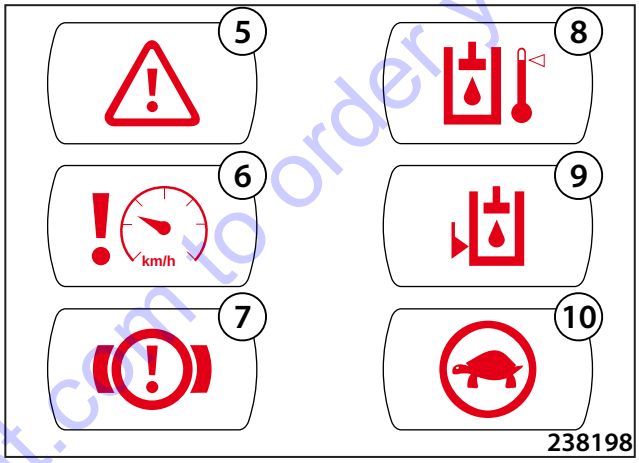
Hydraulic motor speed sensor error (6)

Brake circuit error (7)

High hydraulic oil temperature (8)

Low hydraulic oil level (9)

Emergency (limp) mode active (10)

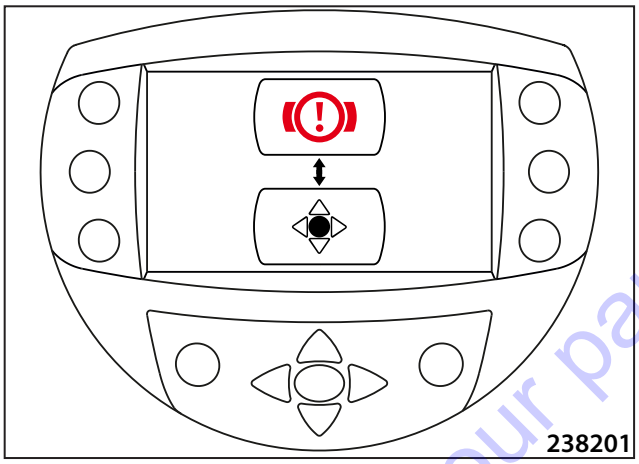


2.9.1.2 Switching to the emergency (limp) mode

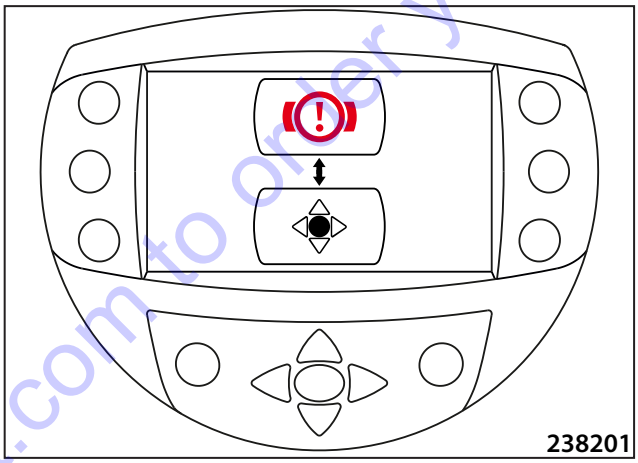
In the event of an error that does not directly prevent the machine from moving, the emergency mode can be activated by a long press of the middle button on the display.

Such an error is shown on the display by alternating the corresponding error symbol and the symbol for confirming emergency mode activation.

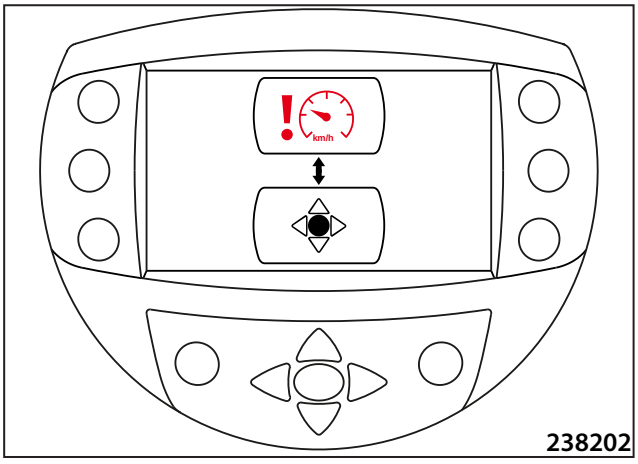
Brake circuit error



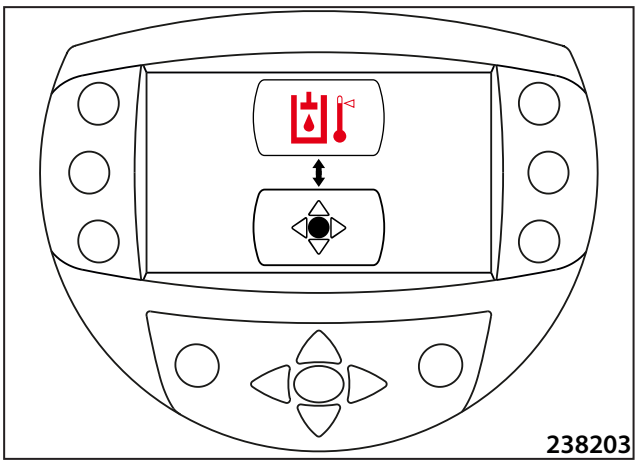
Failed brake test



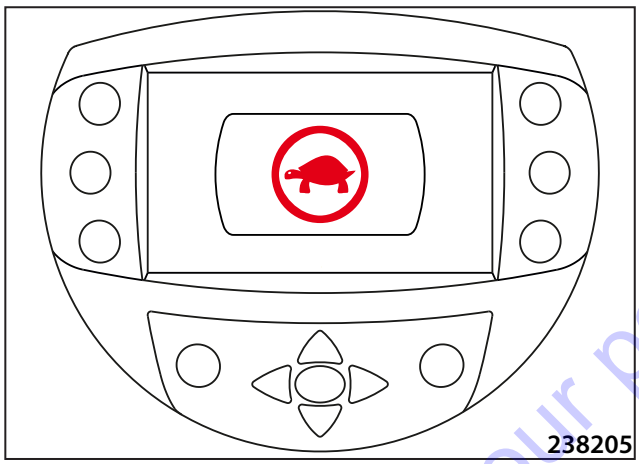
Hydraulic motor speed sensor error



High hydraulic oil temperature



After confirming the dialogue by a long press of the button, the emergency (limp) mode activates. Active emergency mode is indicated by a red tortoise symbol.



After activating the emergency mode, the machine can be operated with the following restrictions:

- Travel is only possible in gear "0".
- Differential lock on.
- Work functions of the machine are locked.

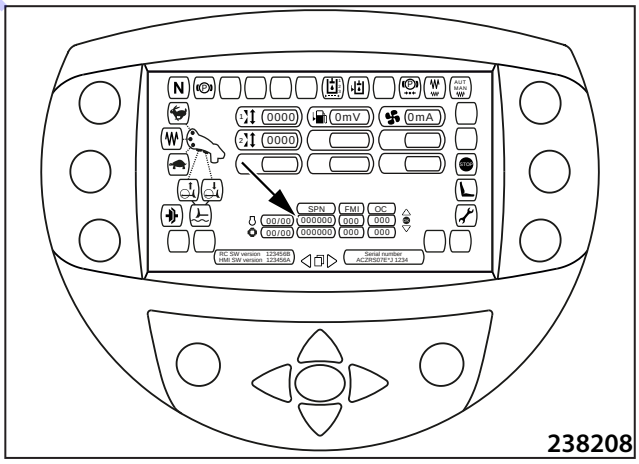
If a fault has been detected in the brake circuit, it is possible to access the work functions and travel at working speed after a successful brake test in the emergency mode.

2.9.1.3 Deactivation of the emergency (limp) mode

The emergency mode can be deactivated in three ways:

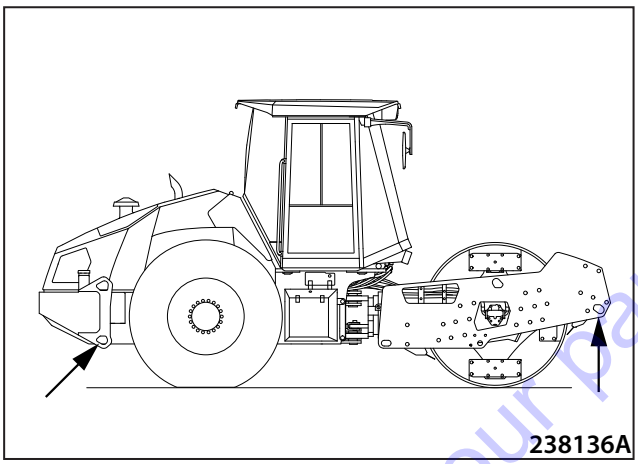
1. The fault is no longer detected and the travel control is in the parking brake position (P).
2. By turning off the engine.
3. The seat switch is deactivated for more than 5 seconds.

If the defect happens again, a service intervention is necessary. The cause of the fault can be identified in the error list on the service screen.



2.9.2 Towing the machine

- For towing, the machine is provided with two towing lugs on the drum frame and with two towing lugs on the rear frame.
- A stuck machine can be towed for a short distance if the engine is running and the travel drive and steering are working.



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 × 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°.

Smooth and constant movement must be maintained in towing. Do not exceed the towing speed by more than 1 km/hour (0.62 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 300 m (0.19 miles).

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.

- If the engine does not work, or there is a defect in the hydraulic system, then you must short-circuit the hydraulic circuit and release the brake of the machine. Then the machine can be towed.

No person may stay on the towed machine!

After the hydraulic circuit of the travel is short-circuited and the machine brakes are released, all of the brakes are disabled!

Before releasing the brake, secure the machine with wooden scotch blocks against movement!

The cab (platform) and the bonnet must be lowered down before the brakes are released.

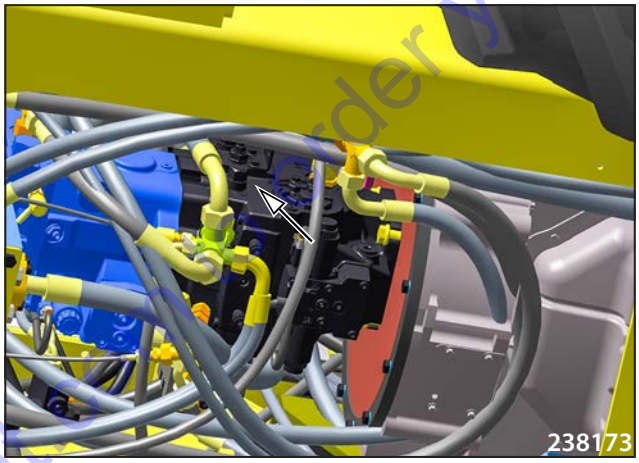
Do not touch hot parts of the machine, there is a burn hazard!

2.9 Special conditions to use the machine

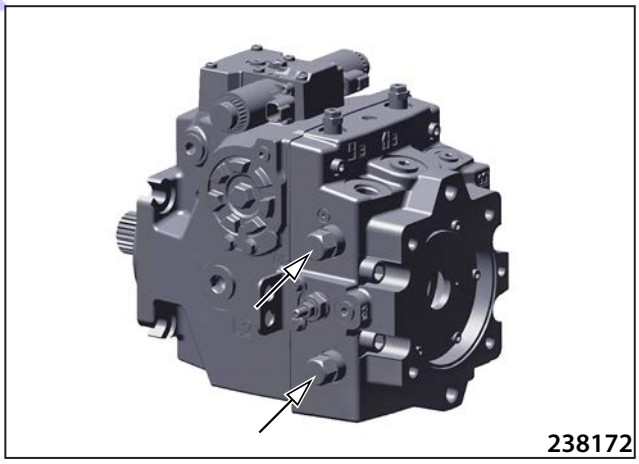
Short-circuiting the travel pump Danfoss:

- Disconnect the battery using the disconnector.

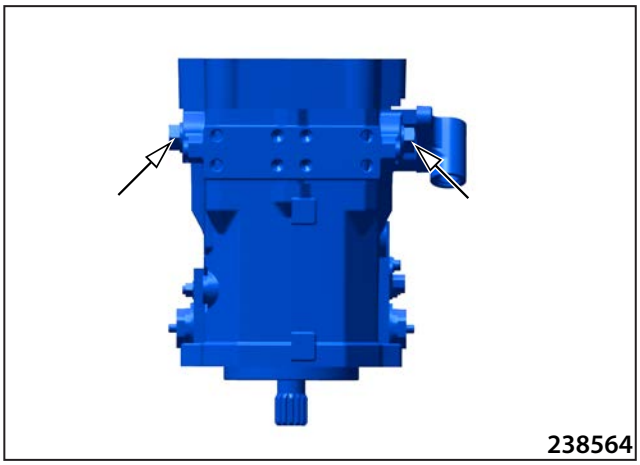
- Short-circuit the hydraulic circuit of the travel by releasing the multiple function valves of the travel pump by 3 revolutions counter-clockwise.



- Pump Danfoss



- Pump Linde



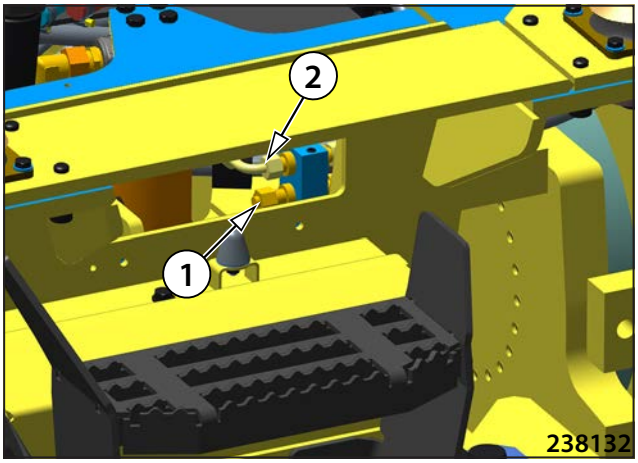
Release of the brakes:

Before releasing the brake, secure the machine with wooden scotch blocks against movement!

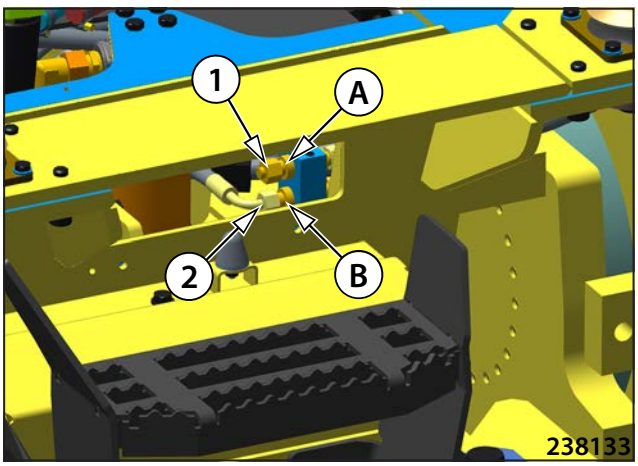
- Place a pan under the machine to catch leaking fluids.

Stop the oil soaking into the ground.

- Remove the plug (1).
- Remove the hose (2).

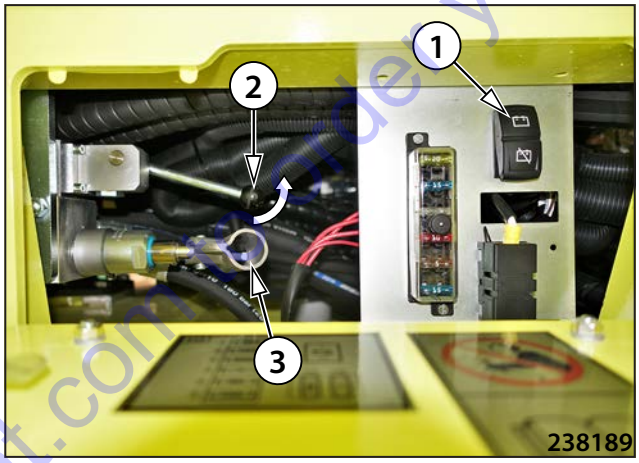


- Mount the plug (1) on the outlet (A).
- Mount the hose (2) on the outlet (B).



- Take the catch pan from under the machine.

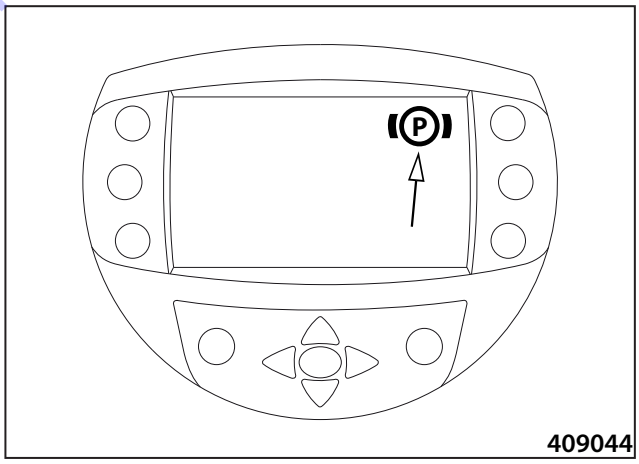
- Turn on the battery disconnector (1).
- Switch over the key to the position "I".
- Insert the lever (2) into the pump and lift the cab by pumping.
- Pump using the lever (3) in the manual hydrogenerator.
- Watch, until the brake indicator lamp goes out when the key is on. The cylinder brake is released and the machine can be towed.



Due to leakages, the pressure in the brakes can drop during the towing.

Check the drum or tyres in the towed machine for braking or skidding. In such a case interrupt the towing and pump again using the lever in the manual hydrogenerator.

After completion of towing, chock the wheels and the drum and restore the machine.



Return of the machine into its original condition:

- Disconnect the battery using the disconnector.

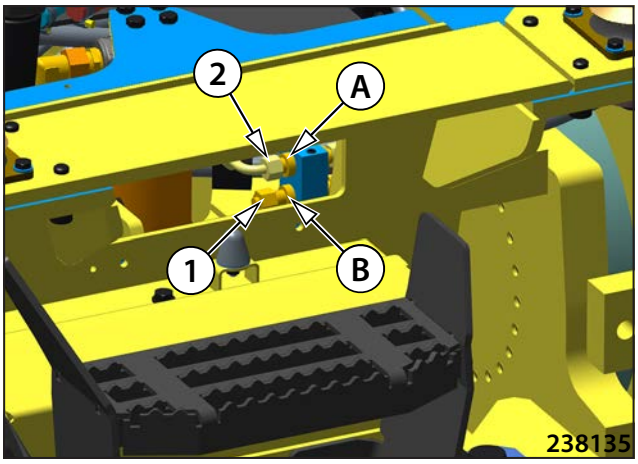
- Screw in the multiple function valves on the hydraulic generator of the travel system.

- Place a pan under the machine to catch leaking fluids.

Stop the oil soaking into the ground.

- Disconnect the hose (2).

The hose can be under pressure. Catch the draining oil into a prepared vessel.



- Remove the plug (1).
- Mount the plug (1) back on the outlet (B).
- Mount the hose (2) back on the outlet (A).
- Put the lever of the hydraulic generator into the holder in the cab.

- Take the catch pan from under the machine.

- Check the hydraulic oil level in the tank. Refill the oil according to chapter 3.6.3 if required.

2.9.3 Machine operation during the initial run-in period

When putting a new machine into operation, during the first 50 hours do not run the machine at full power (uphill driving with vibration).

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).

Preparation for work under low temperatures:

- Check concentration of the engine coolant.
- Replace the oil in the engine with the recommended one for given range of low ambient temperatures.
- Use hydraulic oil of the corresponding cinematic viscosity.
- Replace the oil in the gearbox with the oil recommended for the given range of gearbox temperatures.
- Use winter fuel.
- Check that the batteries are recharged.
- Check the tyre fluid.

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. Both factors reducing the power are independent of each other.
  - 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 external temperatures when the hydraulic oil temperature is constantly about 90 °C (194 °F), we recommend you to replace the oil with the oil having the cinematic viscosity of 100 mm^2/s.

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.

The machine may be used up to the maximum altitude of 4,500m (14,764 ft).

2.9.7 Machine operation in dusty environment

While operating in a very dusty environment, shorten cleaning and replacement intervals of air filter elements and replacement intervals of cabin dust filters, 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 operator'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.

Travelling with vibration on a hard (frozen, concrete, overcompacted) surface or on a bedrock is forbidden. There is a risk of damaging the machine.

3 MAINTENANCE MANUAL

ARS 110
(Deutz Tier 4 Final)

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 given in the lubrication chart after hours worked.
- 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.
- When the tag Machine repair is attached on the steering wheel (the tag is delivered with the machine accessories).
- At cold machine parts.
- After the machine, lubrication points and maintenance places 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 – 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 fire” 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, jerrycans 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.

3.1.3 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 cartridges 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 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.
- 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 (dismounted, exchanged) become hazardous wastes with dangerous properties for the environment.

- This category of waste products includes the following in particular:
  - organic and synthetic lubricating materials, oils and fuels,
  - brake fluids,
  - coolants,
  - battery cartridges and batteries,
  - cooling system media,
  - cleaning and preservative agents,
  - all dismounted filters and filter elements,
  - all used and discarded hydraulic or fuel hoses, rubber-metals 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.

3.2.1 Engine oil

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

Performance classification

With respect to the emission requirements of Tier 4 final, the engine manufacturer requires the use of only such oils that are certified by Deutz.

Permissible oils according to DEUTZ QUALITY CONTROL (DQC):

DQC III LA

DQC IV LA

The current list of oils corresponding to the classification can be found on the engine manufacturer's (Deutz) website (www.deutz.com).

The machine manufacturer uses oil filling according to classification DQC IV LA, type Valar Egida FNA104 10W-40.

If a failure occurs due to the use of incorrect oil, the warranty shall become void.

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.

Note

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

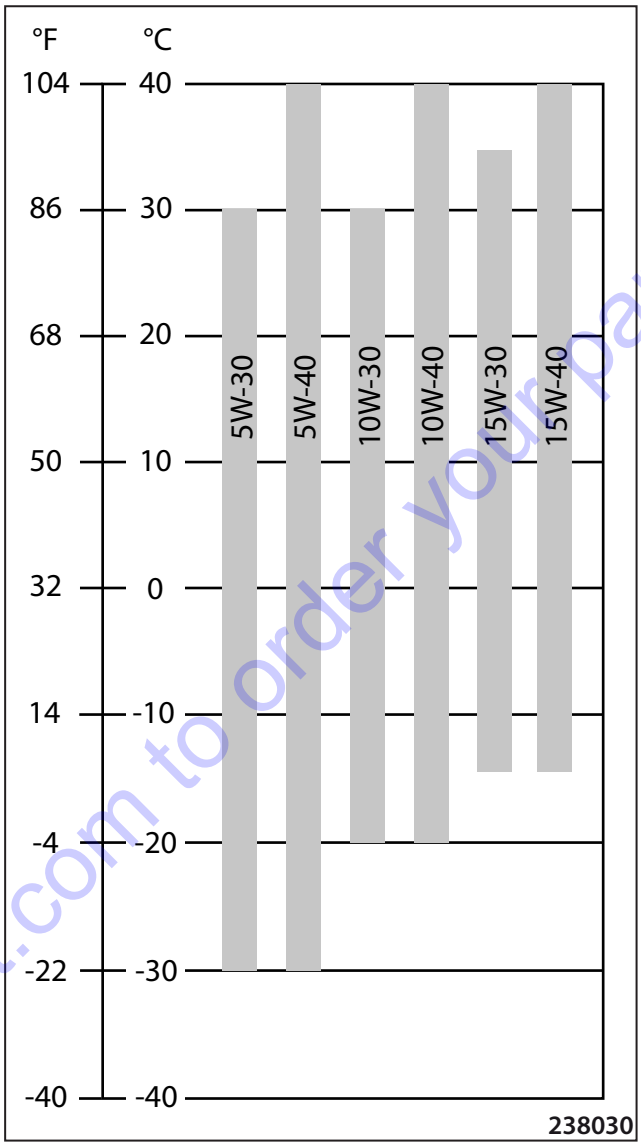
It is recommended that universal multi-range oils are used to avoid the necessity of oil changes due to changes of ambient temperature.

Exceeding the upper temperature limit can result in decreased lubricating abilities of the oil and cause high oil degradation.

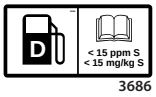
When temperatures are below -40 °C, pre-heat the oil before starting the engine.

Reduce the oil change interval by half if at least one of the following applies:

- **The ambient temperature is constantly below -10 °C**
- **The oil temperature during operation of the machine is below 60 °C.**



3.2.2 Fuel



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Diesel fuel is used as fuel for the engine:

- EN 590
- ASTM D975 Grade 1-D S15
- ASTM D975 Grade 2-D S15

The engine manufacturer allows the use of fuel with a sulphur content not exceeding 0.0015 percent by weight (0.0010 percent by weight for the use of the machine in EU).

The use of fuel with a higher sulphur content will result in void of the engine warranty.

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

Mixing diesel with special additives is forbidden.

Use of HVO fuel

The EN15940 standard approves the use of hydrotreated vegetable oil (HVO) with no guarantee on the performance level due to the characteristics of the fuel (lower density and calorific value).

3.2.3 Coolant

The coolant specification must meet requirements of:

DQC CB-14

DQC CC-14

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 6,000 hours of operation, after 4 years at the latest.

When the thermal protection is required under -37 °C, contact Deutz partners.

Note

The machines are filled with a cooling solution with the Bantleon Avia Antifreeze NG coolant, specification DQC CC-14 at the manufacturer's during the production.

It is a coolant based on monoethylene glycol containing silicates. 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

Use only water whose properties correspond to values in the table:

	min	max
pH value	6.5	8.5
Chlorine content in mg/l		100
Sulphate content in mg/l		100
Water hardness in mmol/l		3.56

If the water properties do not correspond to the values in the table, the water must be treated.

- Too low pH value:
  - add dilute sodium hydroxide or caustic potash.
- Too high total hardness:
  - mix with softened, distilled or desalinated water.
- Too high chloride and/or sulphate value:
  - mix with softened, distilled or desalinated water.

Safety instructions:

1. **Protect your hands with protective gloves.**
2. **In case of ingestion immediately seek medical treatment.**
3. **On 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.**

3.2.4 Hydraulic oil

For the hydraulic system of the machine, it is necessary to use only high-quality hydraulic oils of class according to ISO 6743/HV (equal to DIN 51524 part 3 HVLP; CETOP RP 91 H).

Fill the machines standardly with a hydraulic oil that has cinematic viscosity of 68 mm^2/s at 40 °C (104 °F) ISO VG 68. This oil is the most suitable to be used in the widest range of ambient temperatures.

At high external temperatures when the oil temperature is constantly 90 °C (194 °F), we recommend you to replace the oil with an oil with the kinematic viscosity 100 mm^2/s – HV 100.

If it is necessary to start the machine at temperatures below -8 °C (18 °F) for one month or longer, replace the oil in the hydraulic system with an oil with the kinematic viscosity 46 mm^2/s – viscosity class HV 46.

At temperatures below -13 °C (9 °F), replace it with an oil with the kinematic viscosity of 32 mm^2/s – class of viscosity HV 32; see Operating manual, chapter 2.9.4.

Synthetic hydraulic oil

The hydraulic system can be filled with synthetic oil, which if leakages 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 Gear oil

Use high-quality oils corresponding to API GL-5, or EP or MIL-L-2105 C to lubricate the drum gearbox and the wheel axle drive gearboxes.

Viscosity SAE 80W/90 for ambient temperature range -10 °C ÷ +30 °C (14 °F ÷ 86 °F).

Viscosity SAE 80W/140 for ambient temperature range +20 °C ÷ +45 °C (68 °F ÷ +113 °F).

The operating temperature of the oil must not exceed 85 °C ÷ 90 °C (185 °F ÷ 194 °F).

3.2.6 DEF (AdBlue)

Liquid additive used for the treatment of exhaust gases from SCR diesel engines.

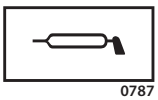
Specification: DIN 70070, ISO 22241-1, ATSTM D 7821.

Trade name in Europe: AdBlue

Trade name in the U.S.: DEF

Use only DEF (AdBlue) according to the recommended specification!

3.2.7 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

3.2.8 Screen washer fluid

When filling the windscreen washer tank, use water (for temperatures above 0°C) and windscreen washer fluid for motor vehicles.

Replace the water with an antifreeze agent at temperatures below 0 °C (32 °F).

3.2.9 Drum coolant

Mixture:

40 litres of water

91 kg of 34% calcium chloride – $CaCl_2$

3.2.10 Air-conditioning filling

Mixture:

1.2 kg coolant Halocarbon 134a

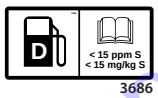
0.2 l of oil PAG 150

3.2.11 Vibrator oil

To lubricate the vibrator, use oils according to:

SAE 75W-90, API GL-5

3.3 Fluids

Part	Fluid type	Fluid quantity l (gal US)	Brand
Engine	Engine oil according to chapter 3.2.1	10 (2.6)	
Fuel tank	Diesel oil according to chapter 3.2.2	345 (91.1)	
Hydrostatic system	Hydraulic oil according to chapter 3.2.4	76 (20.1)	
Drum gearbox	Gear oil according to chapter 3.2.5	1.5 (0.4) - D, PD 2.6 (0.7) - HX, HXPD	
Axle gearboxes	Gear oil according to chapter 3.2.5	2x1.5 (2x0.4) - D, PD 2x1.7 (2x0.4) - HX, HXPD	
DEF tank (AdBlue)	Mixture according to Chapter 3.2.6	22 (5.8)	
Articulation joint bearings – steering joint & steering cylinders	Plastic grease according to chapter 3.2.7	as required	
Engine cooling system	Year-round anti-freeze according to Chapter 3.2.3 – for temperatures up to -25 °C (-13 °F)	32.5 (8.6)	
Drum coolant	Mixture according to Chapter 3.2.9	60 (15.9)	
Vibratory drum	Gear oil according to chapter 3.2.11	7.3 (1.9)	
Air-conditioning	Mixture according to Chapter 3.2.10	-	
Windscreen washers	Water and anti-freeze agent – ratio according to outdoor temperature	2.75 (0.7)	
Tyres	For air or fluid see Operating instructions, Chap. 2.7.9		

Every 20 hours of operation (daily)	
3.6.1	Checking the oil in the engine
3.6.2	Engine coolant check
3.6.3	Checking the oil in the hydraulic tank
3.6.4	Checking the fuel level
3.6.5	DEF (AdBlue) level check
3.6.6	Fan inspection
3.6.7	Air filter dust valve inspection
3.6.8	Inspection of warning and checking devices
3.6.9	Engine leakage check
3.6.10	Exhaust system leakage check
3.6.11	Cleaning the water separator on the fuel filter
3.6.12	Brake test
After 50 hours of operation	
3.6.29	Replacement of ACE filters
Every 100 hours of operation	
3.6.13	Tyre pressure check
After 100 hours of operation	
3.6.28	Checking the wheel screws for tightening
3.6.32	Oil change in travel gearboxes
Every 250 hours of operation	
3.6.14	Air filter sensor check
3.6.15	Machine lubrication
3.6.16	Vibrator oil check
3.6.17	Oil check in travel gearboxes
3.6.18	Checking pad-foot segments
3.6.19	Seat switch check
3.6.20	ACE oil check

3.4 Lubrication and maintenance chart

Every 500 hours of operation, but at least once a year	
3.6.21	Engine oil change
3.6.22	Fuel filter replacement
3.6.23	Air filter cartridges replacement
3.6.24	Engine coolant check
3.6.25	Replacement of the cab ventilation filters
3.6.26	Electrical installation inspection
3.6.27	Replacement of the air filter elements of the air conditioning unit
3.6.28	Checking the wheel screws for tightening **
3.6.29	Replacement of ACE filters *
After 500 hours of operation	
3.6.39	Vibrator oil change
Every 1,000 hours of operation	
3.6.30	DEF (AdBlue) filter replacement
3.6.31	Engine belt inspection
3.6.32	Oil change in travel gearboxes **
3.6.33	Engine intake pipe inspection
3.6.34	Battery inspection
3.6.35	Engine inspection
3.6.36	Damping system check
3.6.37	Inspection of the compressor mounting (air-conditioning unit)
3.6.38	Engine and machine diagnostics
Every 2,000 hours of operation	
3.6.39	Vibrator oil change ***
3.6.40	Cleaning and checking the air conditioning system
3.6.41	Hydraulic oil and filter replacement
3.6.42	Cleaning of the suction filter of the cab lifting and lowering unit
3.6.43	Vent plug replacement
3.6.44	Replacement of ACE oil

Every 6,000 hours of operation	
3.6.45	Coolant change
Maintenance as required	
3.6.46	Fuel system venting
3.6.47	SCR catalyst regeneration (Selective Catalytic Reduction)
3.6.48	Cooler cleaning
3.6.49	Machine cleaning
3.6.50	Scraper adjustment
3.6.51	Drum coolant
3.6.52	Rear-view mirrors
3.6.53	Charging of the battery
3.6.54	Checking the tightness of the cab screw connections
3.6.55	Checking the screw connections for tightening

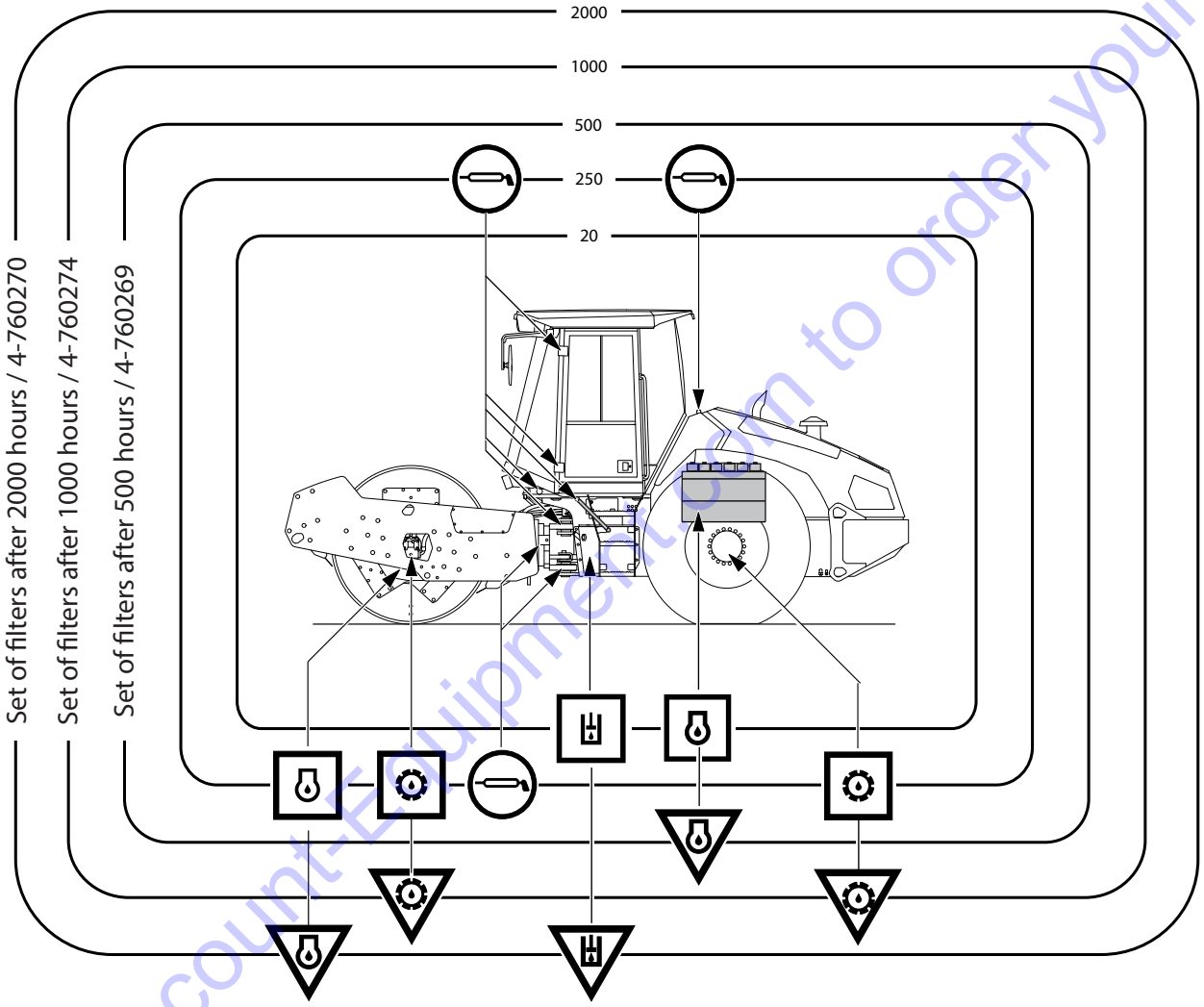
*** First after 50 hours**

**** First after 100 hours**

***** First after 500 hours**

LUBRICATION AND SERVICE PLAN

☐	INSPECTION
○	LUBRICATION
▽	REPLACEMENT



	Engine oil:	**DQC III LA, DQC IV LA**	
	Hydraulic oil:	**ISO VG 68**	**ISO 6743/ HV**
	Lubricating grease:	**ISO 6743/9**	**CCEB 2**
	Gear oil:	**SAE 80W/90; SAE 80W/140**	**API GL-5**

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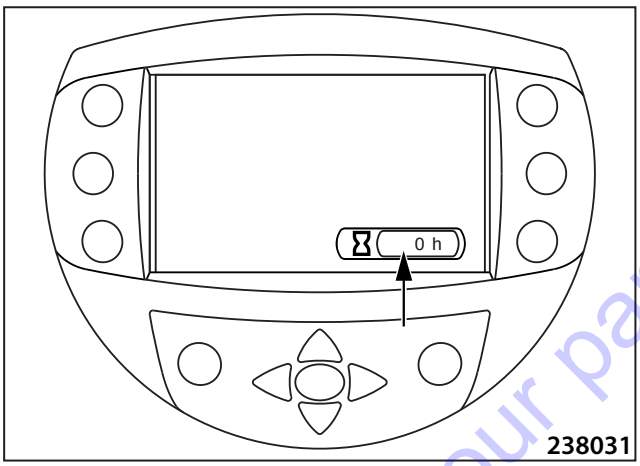
3.6 Lubrication and maintenance operations

Carry out lubrication and maintenance in regular intervals according to daily values on the counter of worked hours.



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 3.6.55 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).

If the engine must be running, enable the service switch.

If the exhaust piping with the flexible piece between the engine and the catalytic converter leaks or is damaged, the machine must not be operated until the defect is repaired.

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

3.6.29 Replacement of ACE filters

After the first 100 hours of operation of the new machine (or after a general overhaul), carry out the following operations according to:

3.6.28 Checking the wheel screws for tightening

3.6.32 Oil change in travel gearboxes

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

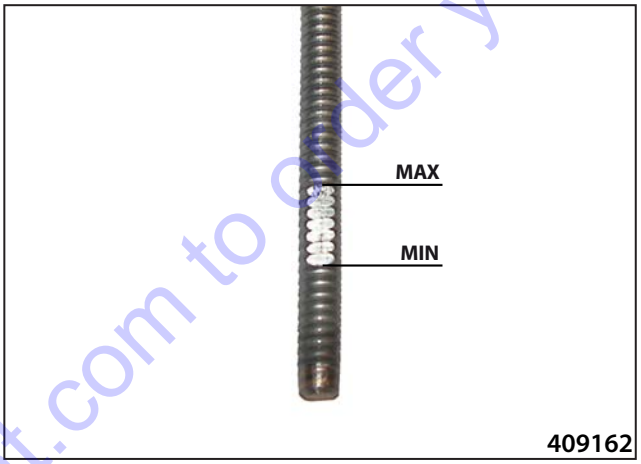
3.6.39 Oil change in the vibrator

Every 20 hours of operation (daily)

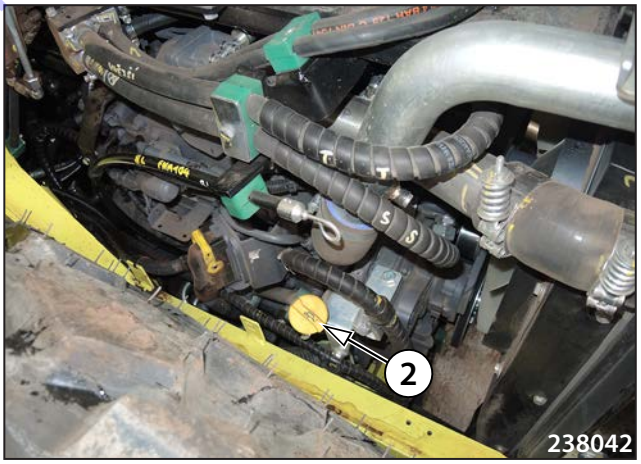
3.6.1 Checking the oil in the engine

- Wait about 5 minutes until the oil runs down to the engine sump.
- Take out the oil dipstick (1), 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.



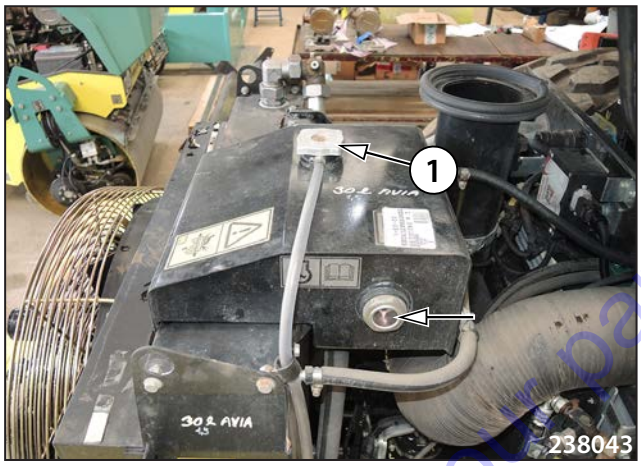
- After removing the filler plug (2), refill the oil through the oil filler. Wait about 1 min. until the level is stable and check again.
- Refill the identical type of oil. Use oils according to chapter 3.2.1.
- Check the engine for leaks and remove the cause.
- Check the engine for damaged and/or missing parts and for changes in appearance.



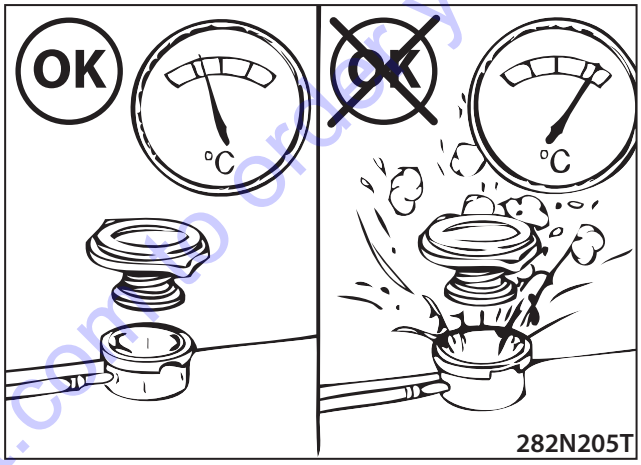
Do not use the engine if the oil level in the engine is not correct.

3.6.2 Checking the engine coolant

- Let the coolant cool below 50 °C (120 °F).
- Check visually the level.
- Refill through the filler neck (1).



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 fall below the sight hole of the level indicator.

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!

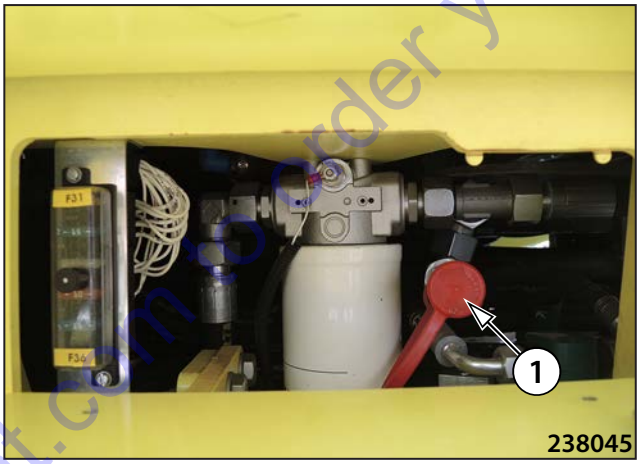
Do not refill cold coolant into a hot engine. There is a danger of damage to the engine castings.

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

3.6.3 Checking the oil in the hydraulic tank

- Check the oil level in the oil gauge.

- Refill the oil using the filling device through the quick coupling (1), proceed according to chapter 3.6.41.



When the level is below the bottom edge of the oil gauge "MIN", the indicator lamp lights up and the engine stops.

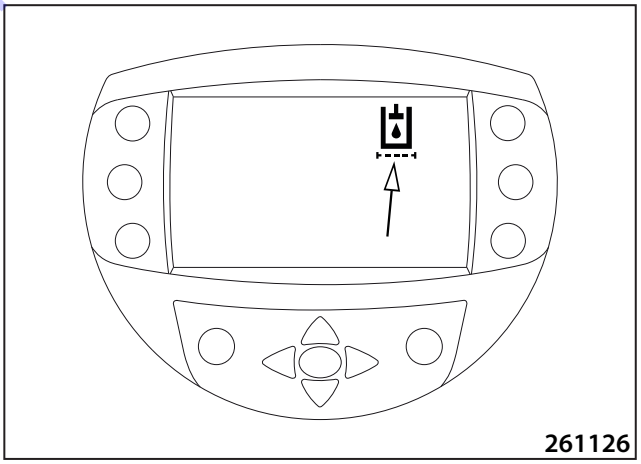
The tank filler neck cap (2) is sealed. If this seal is damaged during the guarantee period of the machine, the guarantee will be cancelled.

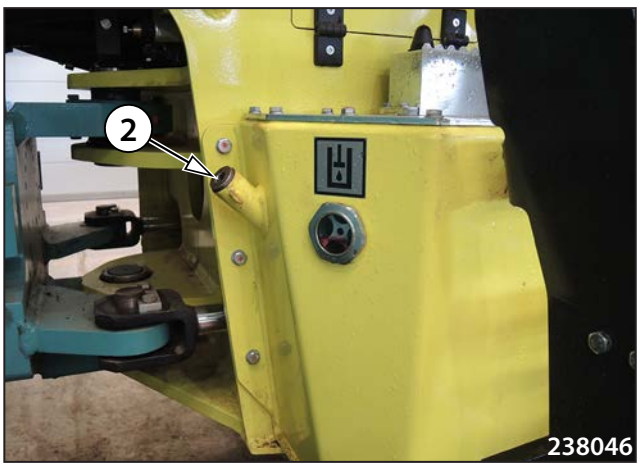
Carry out this refilling method as emergency one – not recommended by the manufacturer!

The oil level must be always visible in the oil gauge!

Fill with the specified oil according to chapter 3.2.4.

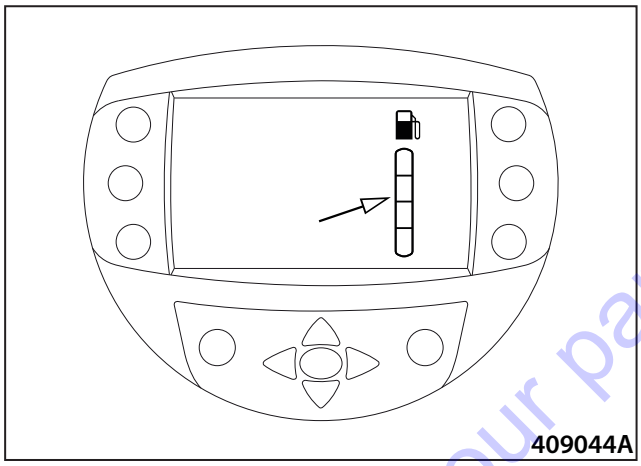
If large oil losses occur, find out the cause of leakage of the hydraulic system (leakage of screwed hose connections, hydraulic generators, hydraulic motors etc.) and remedy the defects.



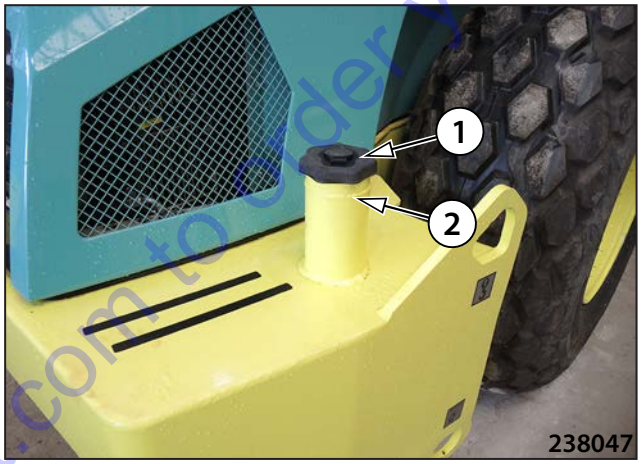


3.6.4 Fuel check

- Check the fuel volume on the display and refill if necessary.



- Clean the tank filler cap (1) and the filler neck (2).
- Unlock the lock and remove the cap.



- Refill the tank up to the bottom line of the filler neck through the strainer.

Note

The fuel tank volume is 345 l (91 gal US).

Do not smoke and do not use open fire when working!

Do not refill the fuel when the engine is running.

Do not pump out the tank completely. After the tank is completely pumped out, the whole fuel system must be vented, which is demanding.

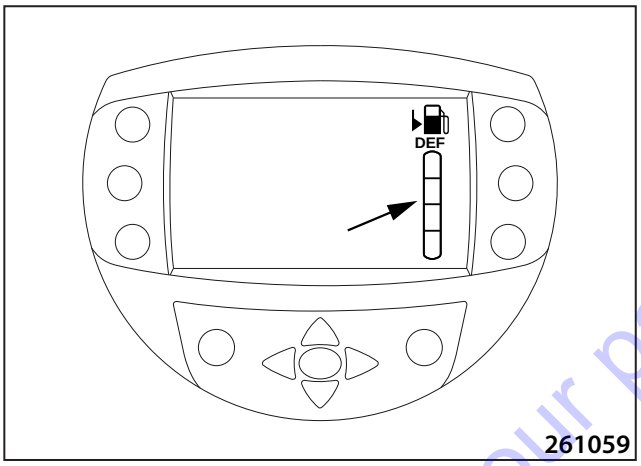
Use only recommended clean fuel according to the chapter 3.2.2.

Do not refill the fuel in closed spaces.

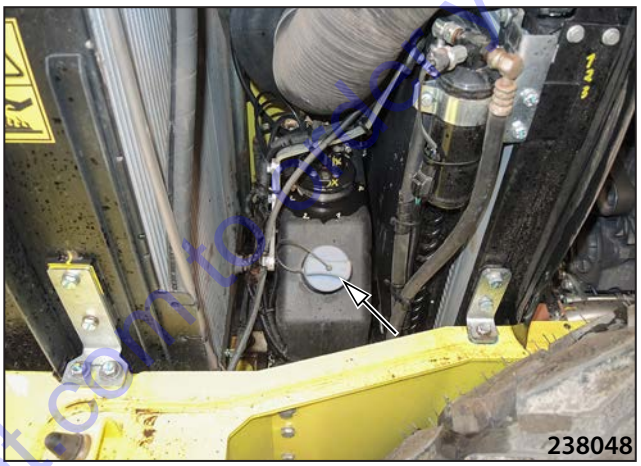
Do not spill the fuel.

3.6.5 DEF (AdBlue) level check

- Check the DEF (AdBlue) volume on the display and refill if necessary.



- Remove the tank cap.
- Refill DEF (AdBlue).



Note

When the DEF (AdBlue) level indicator lights up (< 15 %), refill 18 l (4.8 gal US) to the maximum level of the tank.

Provide adequate ventilation.

In case of insufficient ventilation, wear suitable respiratory equipment. Recommended: organic fumes filter (A type), ammonia filter (K type).

Wear suitable chemical resisting, impervious gloves.

Wear goggles intended for splash water protection.

Avoid contact with skin. Wear suitable protective clothing.

Refill according to the prescribed specification according to Chap. 3.2.6.

Add the necessary volume according to chapter 3.3.

Fill 10 l (2.64 gal US) of DEF (AdBlue) at least or fill up the tank.

The use of an unprescribed fluid results in irrecoverable damage of the SCR system.

If incorrect fluid is used, never switch the ignition on or start the engine!

The DEF (AdBlue) concentration is monitored by the control unit. When quality requirements are not met, the engine power will decrease.

Fill when the engine is not running!

Keep the place clear to avoid contamination of the system with dust from the environment.

DEF (AdBlue) quantity	DEF (AdBlue) level indicator lamp  AMN128	Engine failure indicator lamp  AMN47	Machine reactions
< 15%	Lighting	no	No
< 10%	Flashing slowly (0.5 Hz)	no	No
< 5%	Flashing slowly (0.5 Hz)	Lighting Audible signal	No
< 5% ≥ 10 min	Flashing slowly (1 Hz)	Lighting Audible signal	Engine output reduced by 25 %
< 5% ≥ 15 min	Flashing rapidly (2 Hz)	Flashing Audible signal	Engine output reduced by 25 %
< 5% ≥ 20 min	Flashing rapidly (2 Hz)	Flashing Audible signal	Output reduced to 50 % + max. engine speed reduced to 1,300 rpm.

First aid instructions

Inhalation

Move the exposed person out to fresh air. Get medical attention if health effects occur. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Ingestion

Rinse the mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Get medical attention if health effects occur.

Skin contact

Flush contaminated skin with soap water. Remove contaminated clothing and shoes. Get medical attention if health effects occur.

Eye contact

Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue rinsing with water for at least 10 minutes. Get medical attention if irritation occurs.

General

Evacuate the victim to a safe place as soon as possible. If unconscious, place in recovery position and get medical attention immediately. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. Keep the victim at rest in a well-ventilated area.

Accidental release measures

Environmental principles

Avoid dispersal of spilt material and run-off and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Large spill

Stop leak if without risk.

Move containers from the spill area. Prevent from entering sewers, waterways, basements or closed spaces. Absorb with DRY earth, sand or other non-combustible material. Contaminated absorbent poses the same hazard as the spilled product.

Small spill

Stop leak if without risk.

Move containers from the spill area. Absorb with liquid-binding material (sand, diatomite, universal binders, etc.) or use a spill kit.

Storage

Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Provide adequate ventilation.

3.6.6 Checking the fan for condition

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

3.6.7 Checking the dust valve of the air filter

- 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.

Do not work with the machine if the dust valve is damaged.

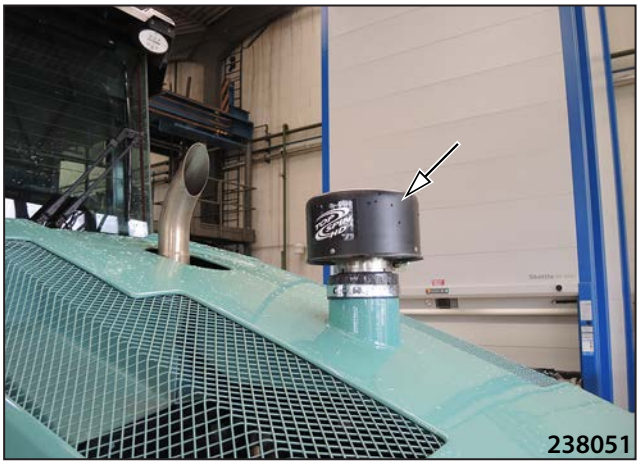
If the dust valve of the air filter is damaged, replace it with a new valve of the same type!

Dust valve
Order number: 1-952454

- Check and clean the pre-filter bowl.

Note

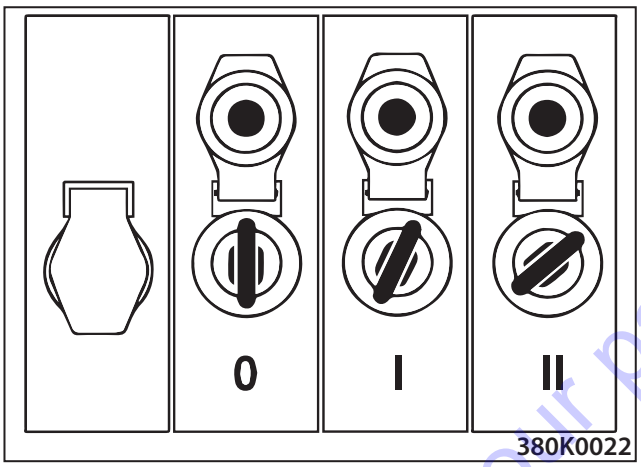
The pre-filter is mounted on special order.



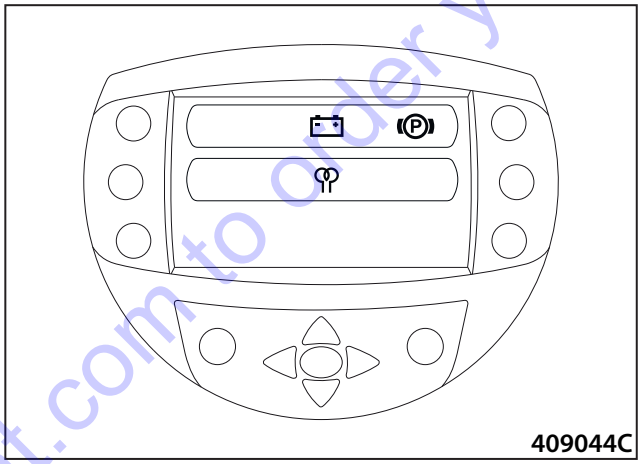
3.6.8 Inspection of warning and checking devices

Check of switches and indicator lamps

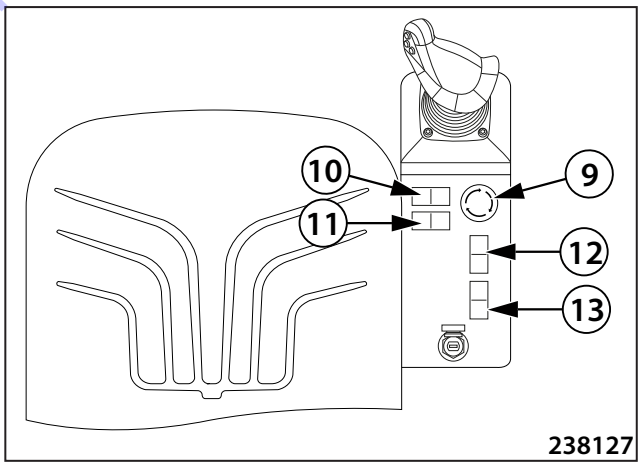
- Turn the key in the ignition box to the position "I".

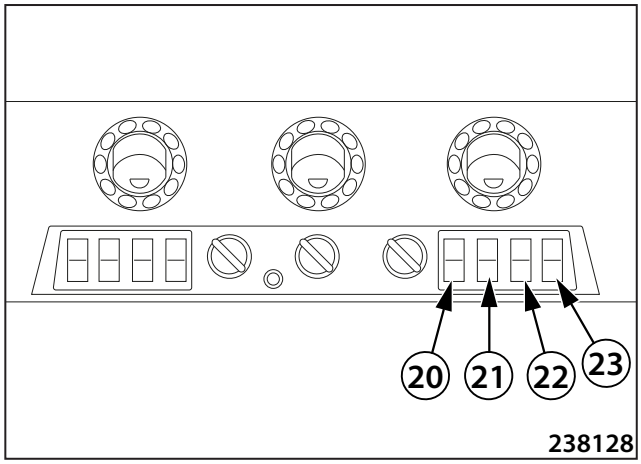


- The brake, charging, lubrication and heating indicator lamps will light up on the display.

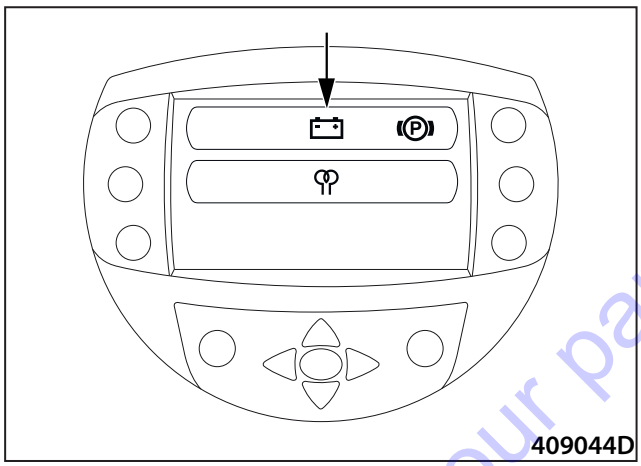


- Then test functions of the switches (9–13, 20–23).

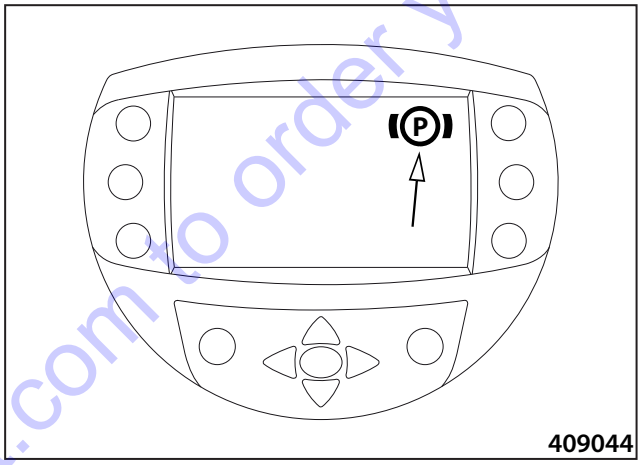




- Turn the key to position "II" to start the engine.
- The charging indicator lamp must go out after the starting is completed.



The brake indicator lamp goes off after the travel control is changed to the neutral position (N).



Use the audible alarm to announce the engine start!

Before starting the engine, check that the engine start does not endanger anyone!

Give the audible alarm before the machine starts moving and wait long enough so that all present persons can leave the area around the machine (space under the machine) in time!

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!

3.6.9 Engine tightness check

- Visually check the engine and the engine compartment for oil leakage.
- Remove the identified defects.

3.6.10 Checking the exhaust system for tightness

- Check the clips, thermal insulation and pipes of the exhaust system.
- Remove the identified defects.

If the exhaust piping with the flexible piece between the engine and the catalytic converter leaks or is damaged, the machine must not be operated until the defect is repaired.

3.6.11 Cleaning of the water separator on the fuel filter

- Turn off the engine.
- Prepare a sediment catch pan.
- Disconnect the connector.
- Release the separator valve by hand by turning to the left by about 3 1/2 revolutions until the valve drops by 25 mm (1 in) down and drain the fuel until clean fuel starts to run off.
- Remount the valve.
- Connect the connector.

Do not smoke and do not use open fire when working!

Do not drain the separator when the engine is running.

Use a suitable pan to catch the drained fuel with the sediment.

3.6.12 Brake test

3.6.12.1 Check of the parking brake

This test verifies the function of the parking brake.

If the driver does not perform the test, the operator is fully responsible for further operation of the machine (the brake test record is stored in the control unit of the machine).

The ability of the parking brake to hold the machine can be checked using the brake test button (1).

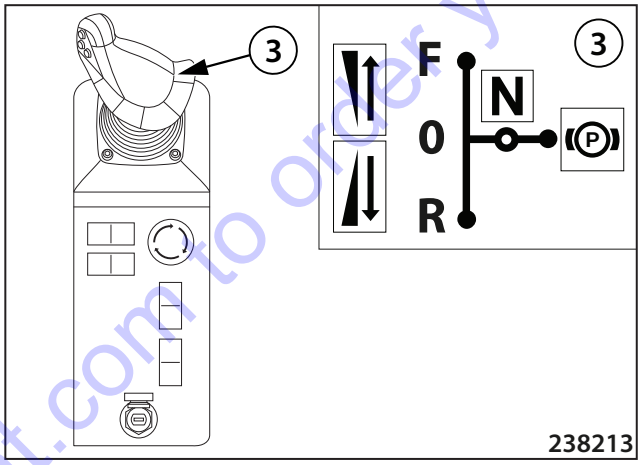
After starting, the traction force of the machine acts on the stationary machine with the parking brake (P) engaged for a given time.

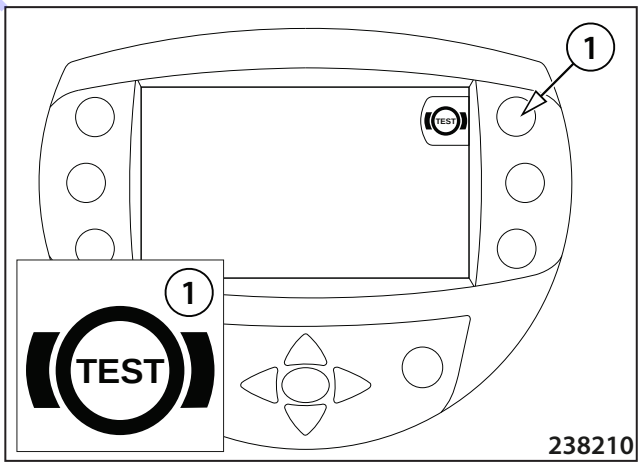
Note

Every 1000 operating hours, have the parking brake checked by an authorised service centre.

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.





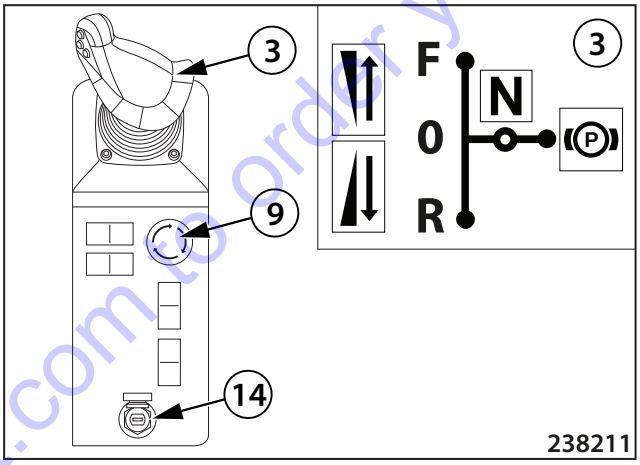
Procedure

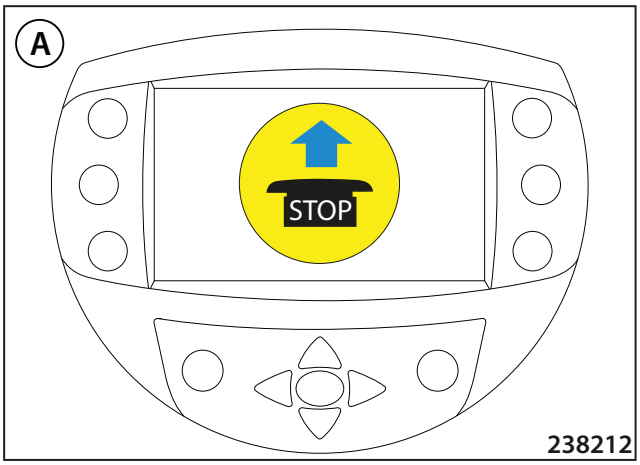
- Place the machine on a flat and solid surface.
- Sit in the driver's position and start the engine according to Chapter 2.7.1.
- The travel control (3) must be in the parking brake position "P".
- Start the test using the brake test button (1). The brake test symbol lights up yellow.
- Set the travel control to the forward travel position "F".
- The test was successful = the display shows "TEST OK".
- The test was unsuccessful = the display shows "TEST NOT OK".
- To end the test, move the travel control back to the parking brake position (P).
- For a new brake test, start the test using the brake test button (1) and follow the instructions above.
- After an unsuccessful brake test, secure the machine against spontaneous movement by wedges and contact service.

3.6.12.2 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 (3) to the neutral position "N".
- The parking brake indicator lamp goes off.
- The machine is unbraked.
- Press the emergency brake button (9). The engine stops and the parking brake indicator lamp and the warning symbol (A) light up.
- If the engine does not shut down, turn it off using the key in the ignition box (14), secure the machine against spontaneous movement using wedges on a level and solid surface and contact service.
- To start the machine again, move the key in the ignition box (14) to the "0" position and turn the emergency brake button (9) slightly to release it.

Note

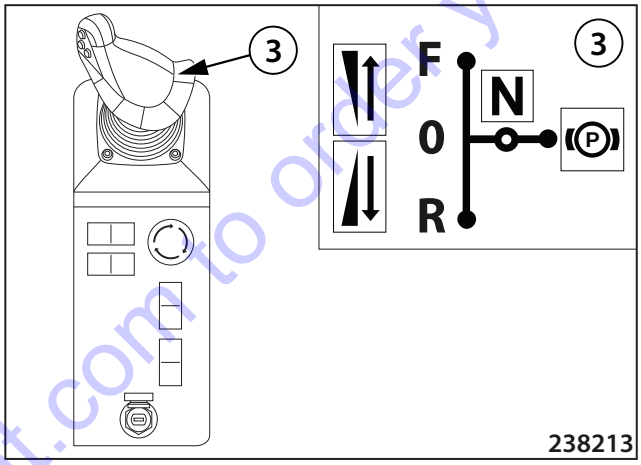
The emergency stop button (9) is only to be used to stop the machine in an emergency. Use the service brake to stop the machine normally. To turn off the engine normally, use the ignition box (14) – turn the key to the "0" position.

3.6.12.3 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 (3) 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 (3) 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.

Every 100 hours of operation

3.6.13 Tyre pressure check

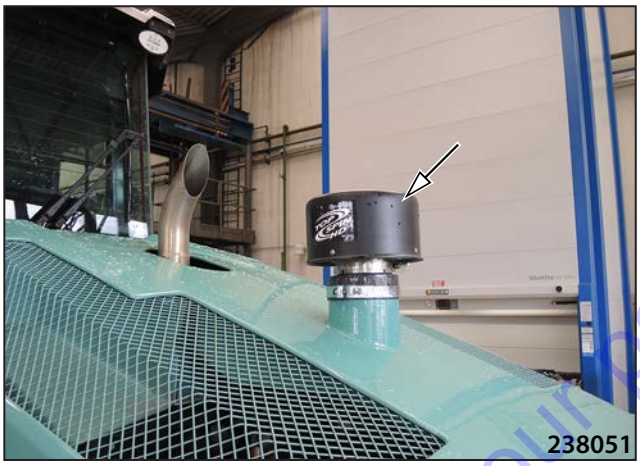
Turn the tyres so that the valve bodies are in the highest position.

- Check the pressure with a pressure gauge when the tyre is cold.
- Maintain the tyre pressure at 160 kPa (23.2 PSI).

Every 250 hours of operation

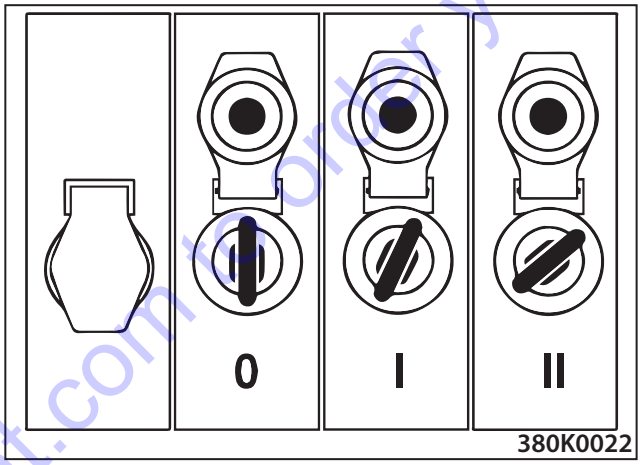
3.6.14 Checking the sensor of the air filter

- Remove the engine intake cover or pre-filter.
- Cover the air filter suction hole on the engine bonnet.

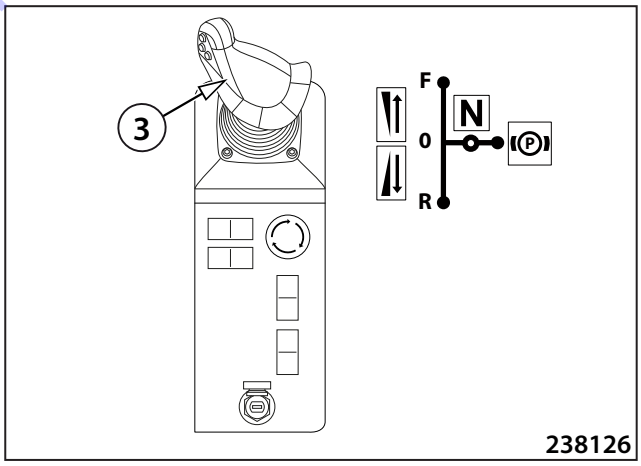


Do not use thin paper for covering – risk of intake hole clogging!

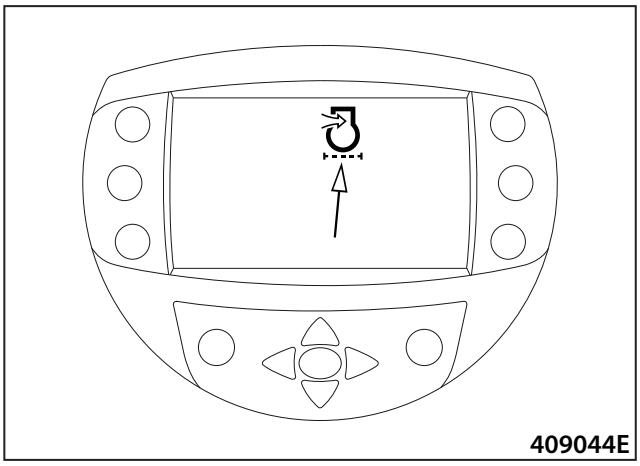
- Turn the key to position "II" to start the engine.



- Enable the service switch.
- Set the travel control to the brake position (P) – engine idle speed.

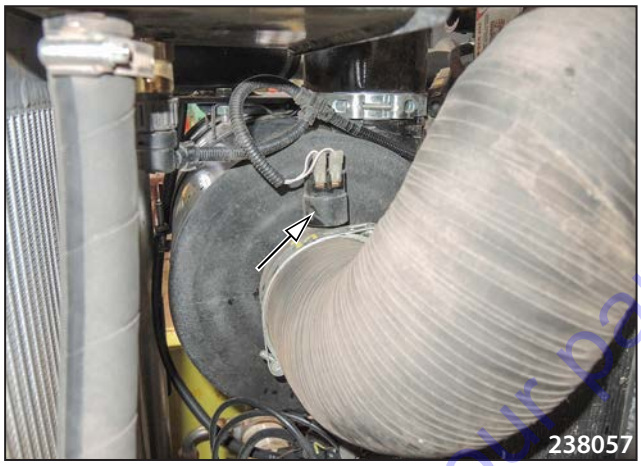


- After it is covered, the indicator lamp for the air filter clogging must light up.



- If the indicator lamp does not light up, check the vacuum switch, contacts and supply cables.

Sensor
Order number: 4-5358520063



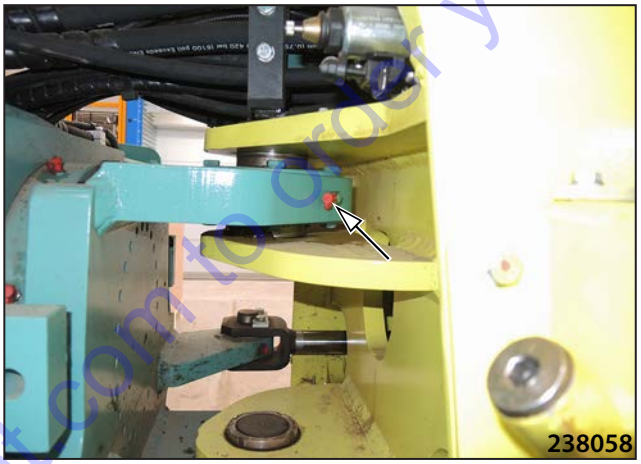
3.6.15 Machine lubrication

- Remove the caps on the oil nipples.
- Put on the oil nipple of the high-pressure press gradually and lubricate until the old grease starts flowing out.
- Replace the oil nipple caps.

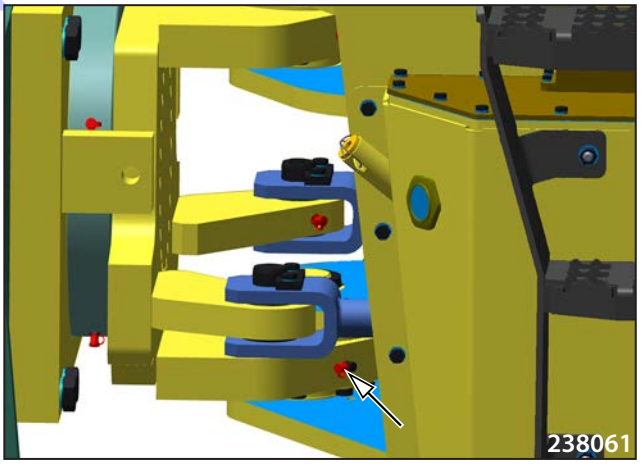
Use recommended lubricating greases; see chapter 3.2.7.

Steering joint

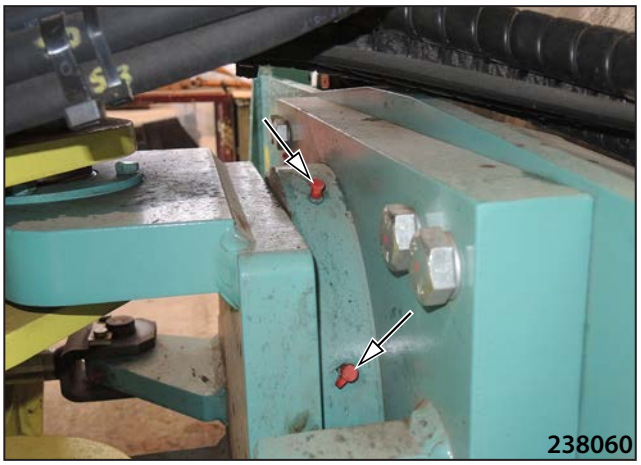
upper bearing



lower bearing

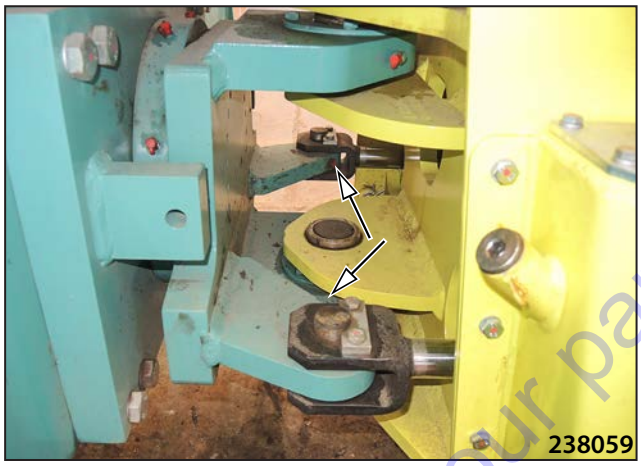


bearing 4×



Linear hydraulic motors of steering

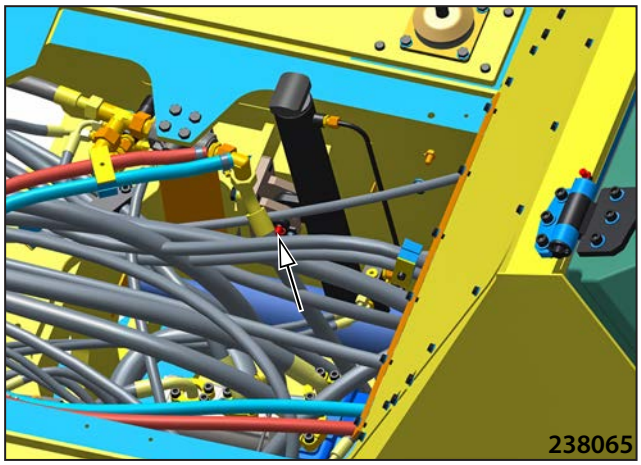
front pins 2×.



rear pins 2×

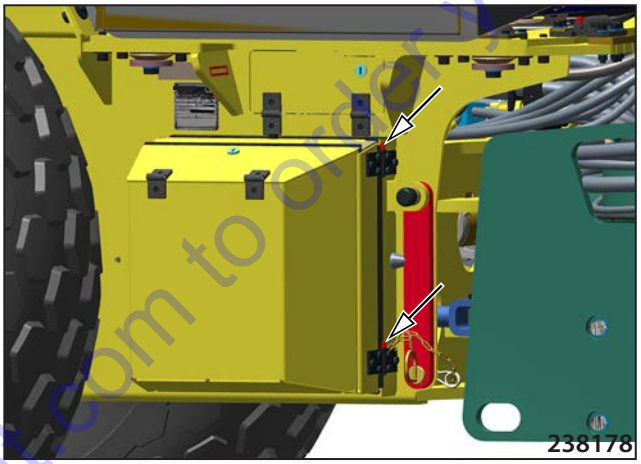
Linear hydraulic motor of lifting off the driver's stand

lower pin



Door hinges pins

pins 4×

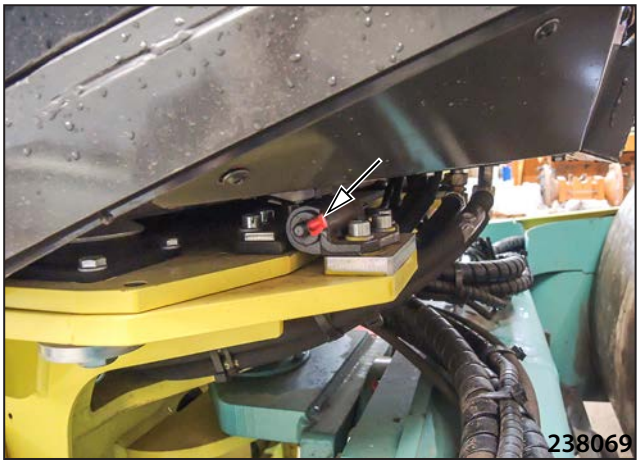


Bonnet hinges pins

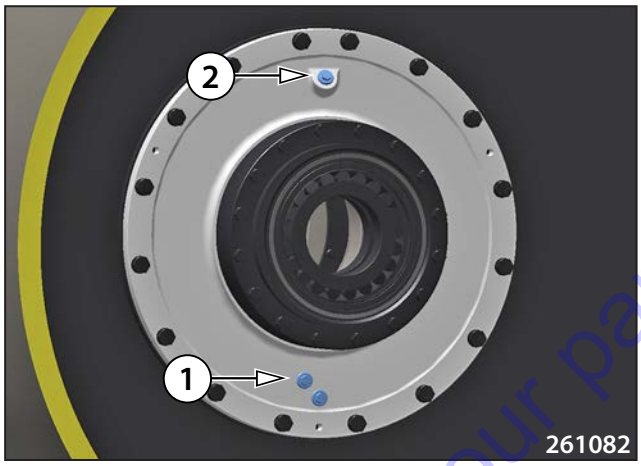
pins 2×

Front pins of the cab mounting

pins 2×



3.6.16 Checking the oil in the vibrator



- Stop the machine so that the plugs of the drum on the left side are in the position according to Fig.
- Clean the area around the check plug (1).
- Unscrew the plug (1) and check the oil level. The level must reach to the inspection hole or flow out slightly.
- Unscrew the filler plug (2) and refill the oil.
- Clean the plugs and remount.

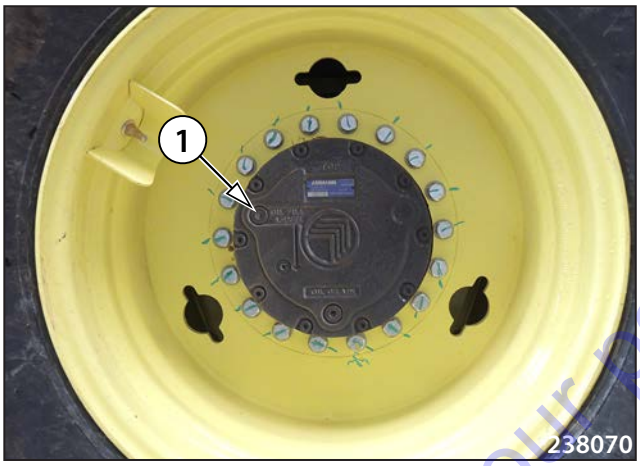
Refill the same type of oil.
Check the oil when it is cooled down.

Stop the oil soaking into the ground.

3.6.17 Checking the oil in travel gearboxes

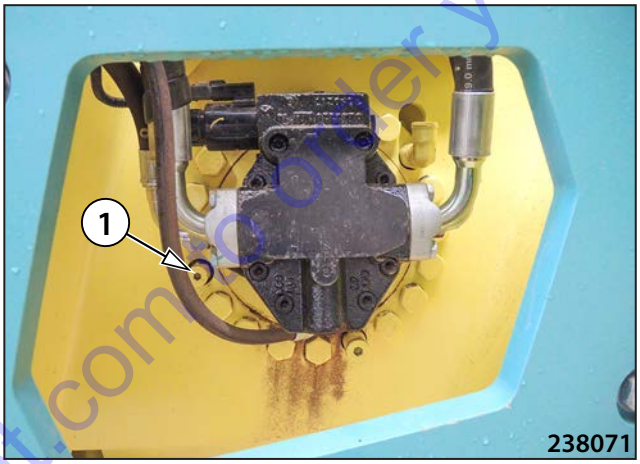
Axle gearbox

- Stop the machine on a flat and solid surface so that the plugs of the gearboxes of both wheels are in the position according to the picture. (The check plug (1) is in the horizontal axis.)
- Clean the area around the check plug (1).
- Unscrew the plug (1) and check the oil level. The level must reach to the inspection hole or flow out slightly.
- Refill oil through the check plug (1) if necessary.
- Clean the plugs and remount.

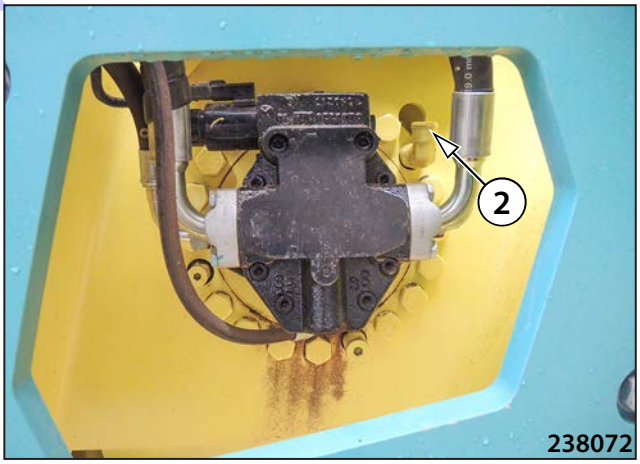


Drum gearbox

- Clean the area around the check plug (1).
- Unscrew the plug (1) and check the oil level. The level must reach to the hole or the oil must flow out slightly.



- Refill oil through the filling plug (2) if necessary.
- Clean the plugs and remount.
- Check tightness of the gearboxes.



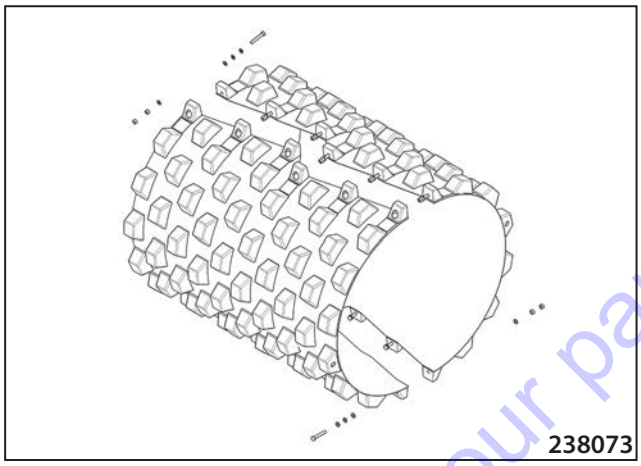
Do not touch the gearbox and adjacent parts if they are hot.

Refill the same type of oil.

Stop the oil soaking into the ground.

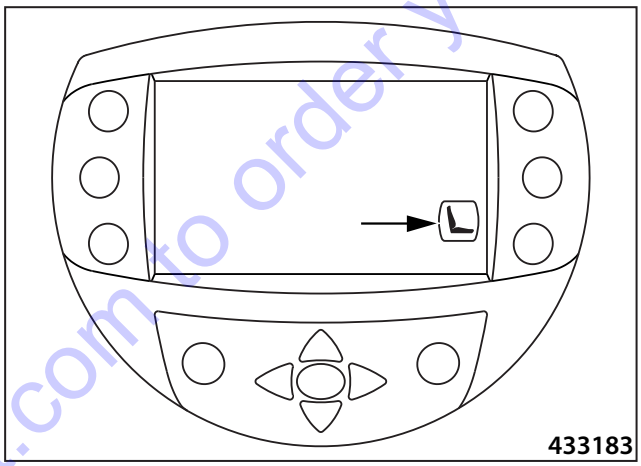
3.6.18 Checking the pad-foot segments

- Before checking, clean the surface of the segments mainly around screw connections. Check the segments for general condition (cracks, deformations) and the screws M20 8G for tightening to the torque of 390 Nm (287.6 lb ft).



3.6.19 Seat switch check

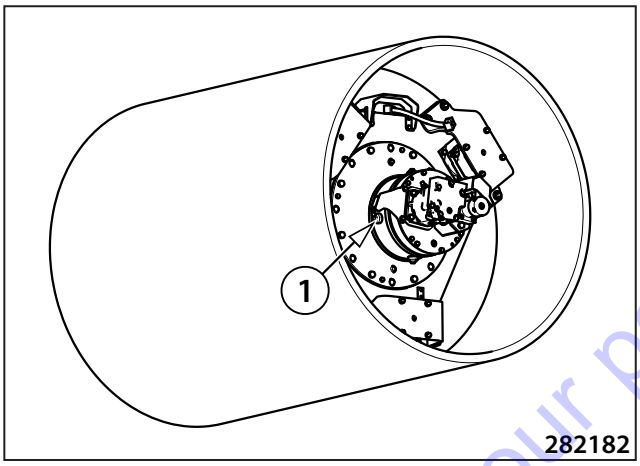
- Sit on the seat.
- Turn the key to the "II" position to start the engine.
- Move the travel control (3) to the neutral position (N).
- Get up from the seat for less than 10 seconds.
- The seat switch icon must appear on the display with an interrupted audible signal.
- After you sit on the seat again, the icon must go off and the audible signal must stop.
- Move the travel control (3) to the brake position (P).



3.6.20 ACE oil check

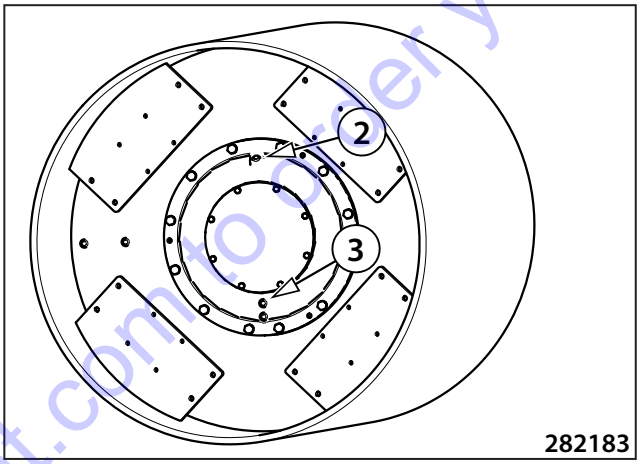
Left side

- Unscrew the plug (1) and check the oil level.
- The level must reach the inspection hole or flow out slightly.



Right side

- Move the machine so that the plug (2) is in the highest position.
- Unscrew the plug (3) and check the oil level.
- The level must reach the inspection hole or flow out slightly.
- Refill oil if needed.



Refill the same type of oil.
Check the oil when it is cooled down.

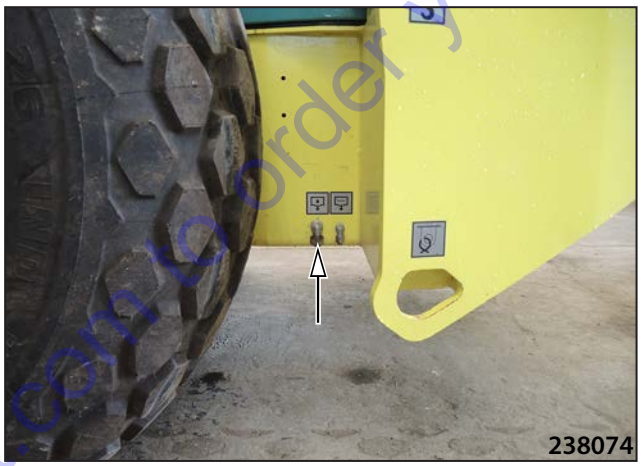
Prevent oil from soaking into the ground.

Every 500 hours of operation, but at least once a year

3.6.21 Engine oil change

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).

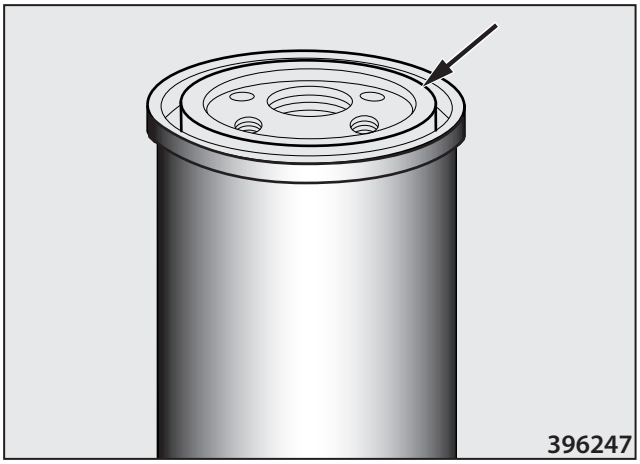
- Turn off the engine.
- Prepare a suitable vessel with the volume of approximately 20 l (5.3 gal US).
- Remove the drain plug and let the oil drain out.
- Remount the plug.



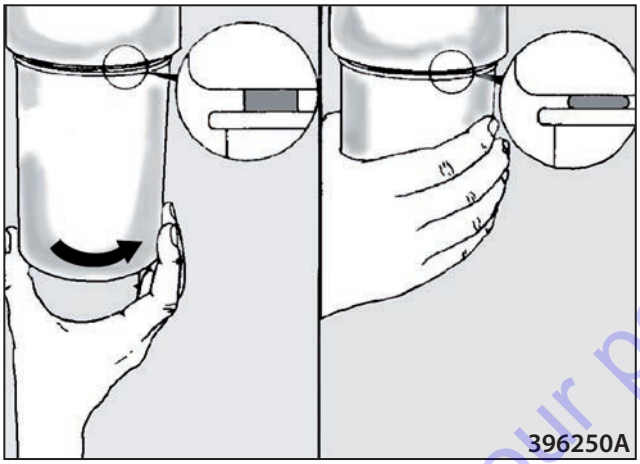
- Clean the surface around the head of the oil filter.
- Dismount the filter (1).
- Clean the seating surface for the filter gasket.

- Take the new filter.
- Lubricate the gasket with oil.

Oil filter
Order number: 5-0020003



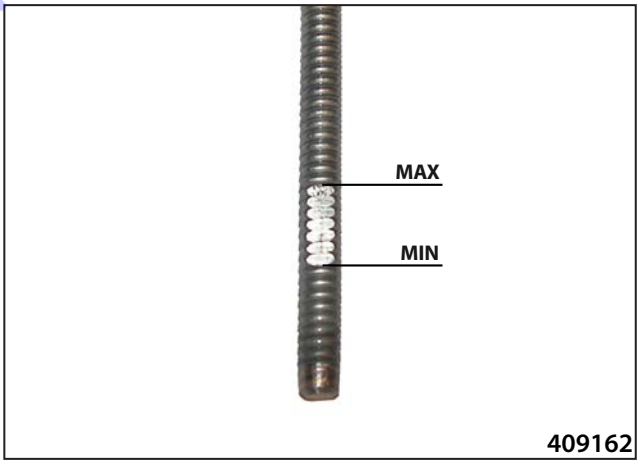
- Tighten the filter by 3/4 to 1 revolution after the filter makes contact with the filter head.
- Tightening torque 15-17 Nm (11-12.5 lb ft).



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

- Fill the engine through the filler.

- Refill the oil to the upper oil level mark (MAX).
- The oil volume is 10 l (2.6 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, wait for 5 minutes until the oil runs down to 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!

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 oil – 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.

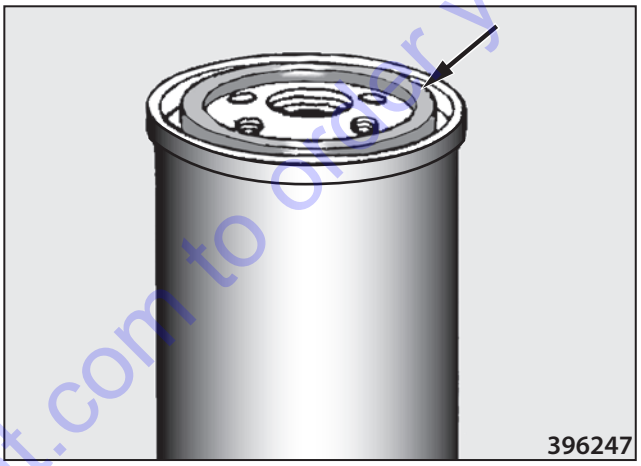
3.6.22 Fuel filter replacement

Fuel filter

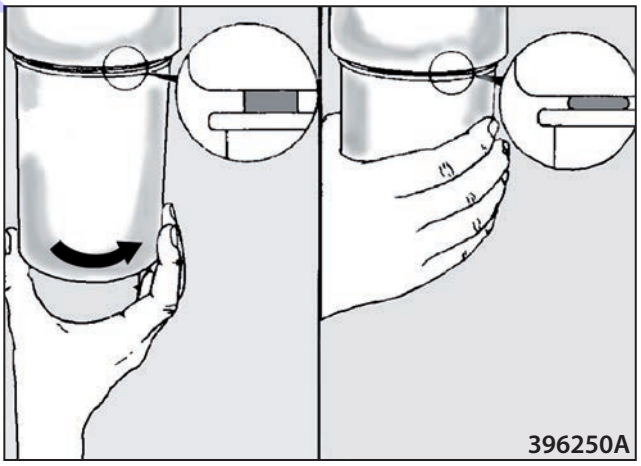
- Clean the fuel filter head.
- Remove the filter.

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

Fuel filter
Order number: 1238008



- Retighten the filter by 3/4 revolution after the filter is in position.
- Tightening torque 10–12 Nm (7.4–8.9 lb ft).

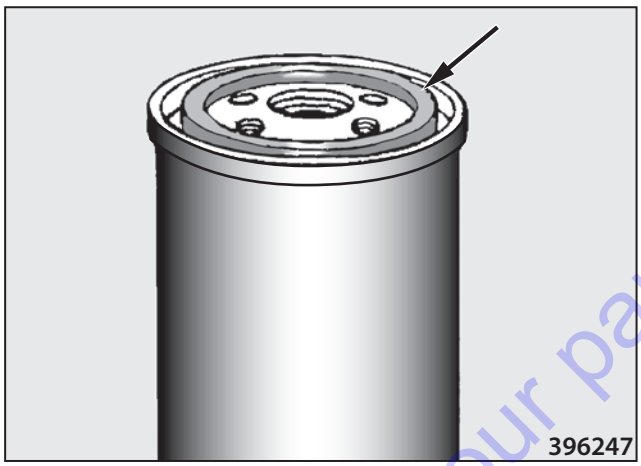


Fuel pre-filter

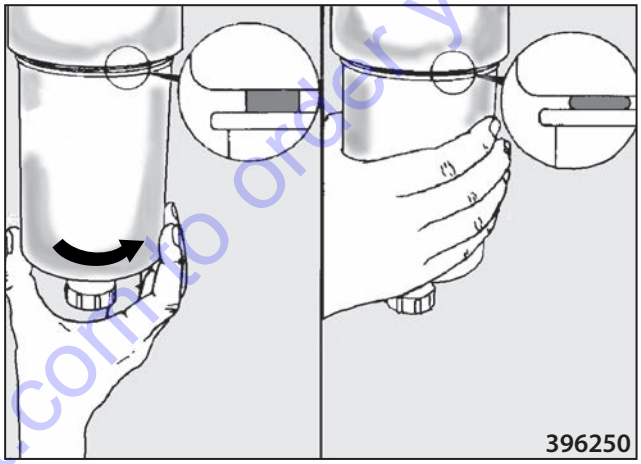
- Disconnect the connector of the water separator sensor.

- Clean the fuel filter head and dismantle the filter.
- Lubricate the seal ring of the new filter with oil.

Fuel filter
Order number: 1229401



- Tighten the filter by 3/4 revolutions after the filter makes contact with the filter head and connect the connector of the water separator sensor.
- Tightening torque 17-18 Nm (12.5-13.3 lb ft).



Use specified original filters.

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!

Catch the drained fuel.

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

3.6.23 Air filter cartridges replacement

- The proper maintenance of the air filter and of the whole inlet manifold, the rubber parts in particular, will protect the engine against dust effects significantly and extend the element lifetime and efficiency.
- The side effect of the filter clogging is the smoking exhaust pipe, higher fuel consumption, power loss and increased temperature of the engine.

Principles of correct replacement of the filter cartridge:

- Slowly pull out the clogged element as carefully as possible.
- Always clean the inner bodies of the cleaner to prevent dust from entering the interior of the inlet manifold to the engine.
- Clean the seating surfaces for the gasket in the cleaner body.
- Examine dust marks in the removed cartridge that show its leakage in the filter body.
- Push the gasket on the new cartridge to check it for flexibility.
- Check that the gasket sits correctly.

Never use damaged elements!

Do not use different elements than required!

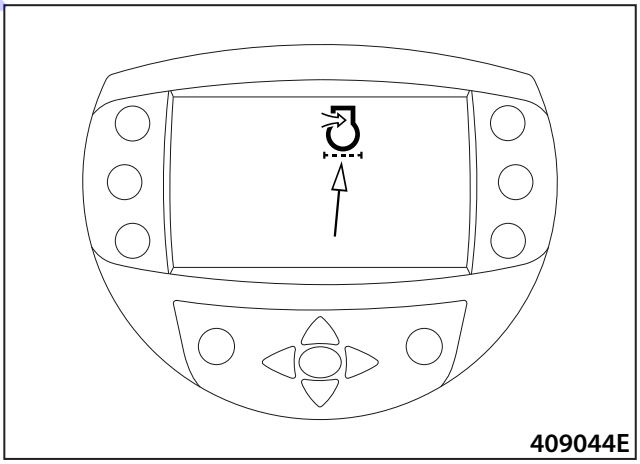
Do not remove the cartridges only for checking purposes!

The filter must not be open longer than necessary!

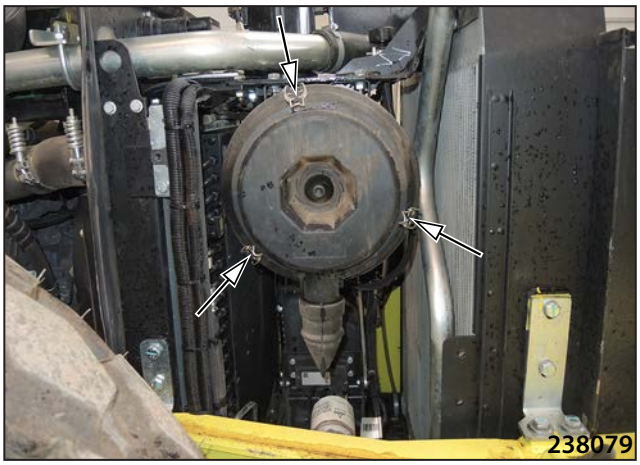
Never operate the machine with the damaged filter body!

Air filter cartridge replacement:

- The air filter contains a main element and a safety element.
- Always replace the main and safety elements when the indicator lamp indicates that the air filter is clogged.
- Check the air cleaner and inlet manifold for fastening and integrity.


409044E

- Lift off the bonnet to the end position.
- Remove the filter cap.

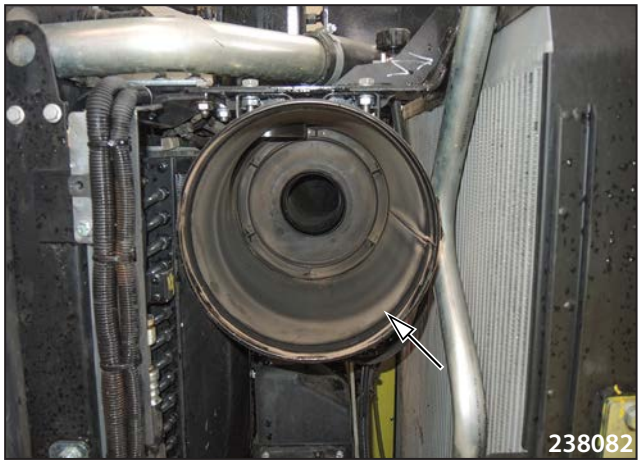

238079

- Take out the main cartridge.

Air filter element (set)
Order number: 1229388

- Take out the safety element.

- Clean the internal area of the filter and of the contact surface so that no dust is taken into the supply piping towards the engine. Check connections and the piping for leakage and the engine inlet opening on the bonnet for clogging (e.g. by leaves).



Never use compressed air to clean the filter interior.

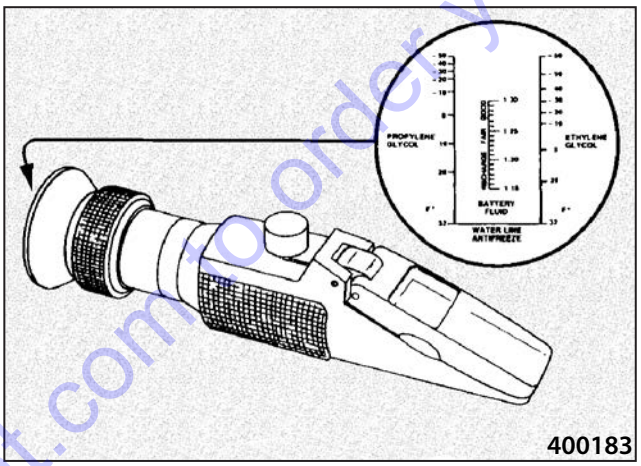
- Insert the new safety cartridge.
- Insert the new main cartridge. Check that both cartridges are mounted correctly and are sealing.

- Remove the dust valve, clean it and remount.

Dust valve
Order number: 1-952454

3.6.24 Engine coolant check

- Check the antifreeze concentration in the coolant using a refractometer.



Always check the coolant before the winter season. If the measured concentration is not for the temperature of -36 °C (-34 °F), adjust it by adding the antifreeze into the coolant or change the coolant.

- Add anti-freeze agent according to the chapter 3.2.3.

3.6.25 Replacement of the cab ventilation filter

- Remove the filter cartridge.
- Dust the cartridge carefully.
- If the cartridge is damaged or cannot be cleaned properly, replace it with a new one.

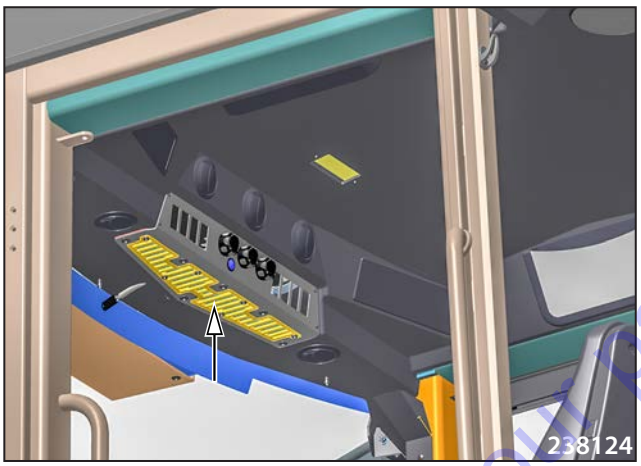
Air filter
Order number: 1583817

When working in a very dusty environment, shorten the cleaning intervals.

3.6.26 Electrical installation check

- 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.

3.6.27 Replacement of the air filter elements of the air conditioning unit



- Remove the top grate.
- Replace the filter.

Air-conditioning filter
Order number: 4-32925

3.6.28 Checking the wheel screws for tightening

Carry out for the first time after 100 hours

- Using a torque spanner, check wheel disk screws for tightening.
- Tightening torque 165 Nm (122 lb ft).

3.6.29 Replacement of ACE filters

Carry out for the first time after 50 hours

- Replace the filter.

Every 1,000 hours of operation

3.6.30 DEF (AdBlue) filter replacement

Keep clean.

Provide adequate ventilation.

In case of insufficient ventilation, wear suitable respiratory equipment.

Recommended: organic fumes filter (A type), ammonia filter (K type).

Wear suitable chemical resisting, impervious gloves.

Wear goggles intended for splash water protection.

Avoid contact with skin. Wear suitable protective clothing.

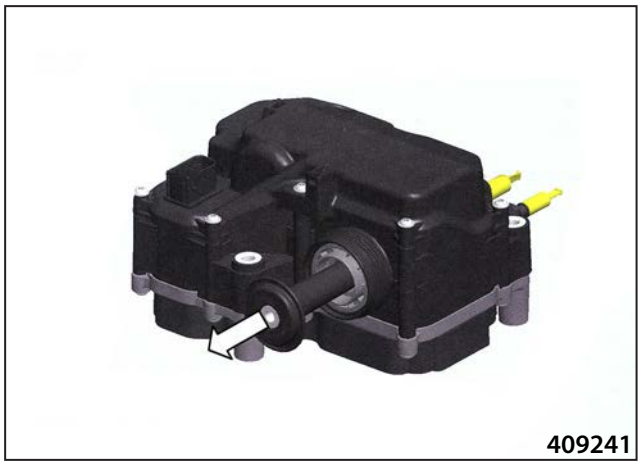
- Turn off the engine.
- Remove the cover.


238175

- Place a container under the filter.
- Remove the cap.


409240

- Pull out the levelling item.


409241

- Remove the cartridge.


409242


409243

- Check the thread and clean the seating surface.


409244

- Lubricate the gasket with oil.
- Insert the new filter.

Filter cartridge
Order number: 1391087


409245

- Insert the new levelling item.


409246

- Mount the cap.
- Tightening torque 22.5 ± 2.5 Nm (16.6 ± 1.8 lb ft).


409247

Use only original filters.

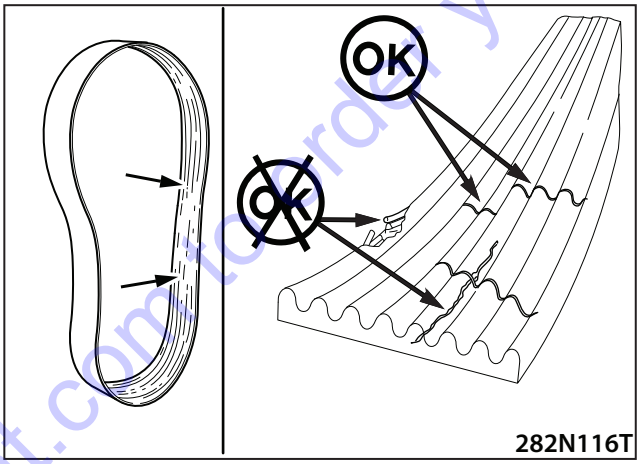
Do not overtighten the filters to prevent damage to the thread and gasket.

Dispose used filters in compliance with regulations.

3.6.31 Checking the engine belt

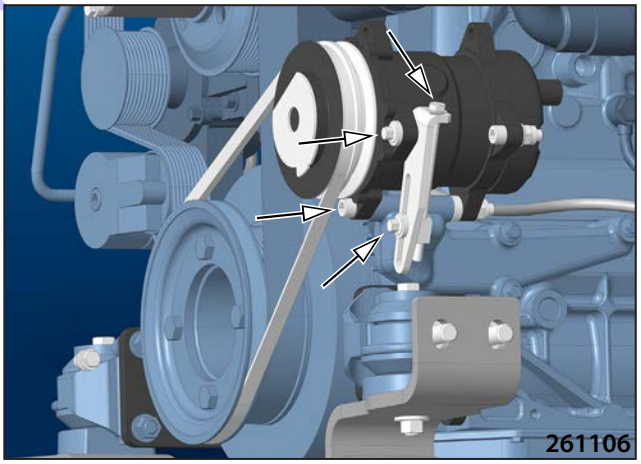
- Checking the engine belt for wear.
- Visually inspect the belt.

- 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.



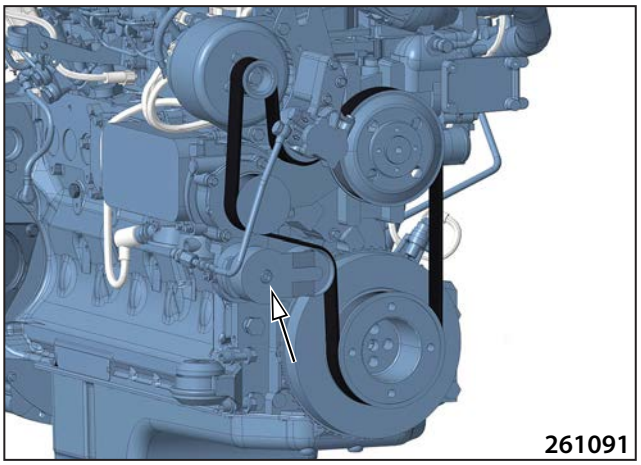
Replacing the air-conditioning belt:

- Loosen the screws and move the compressor.
- Take out the air-conditioning belt.



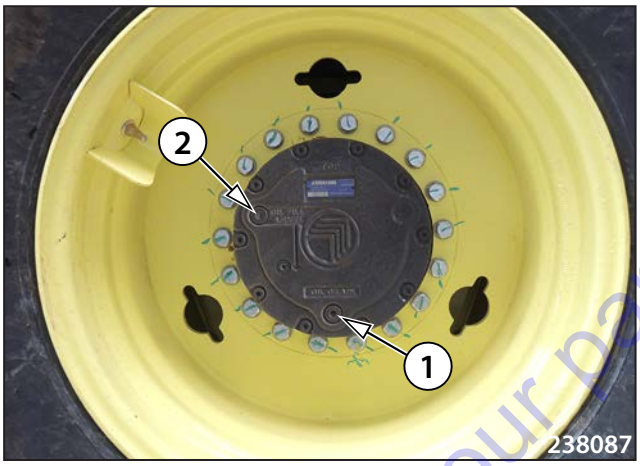
Replacing the engine belt:

- Lift off the tension pulley of the belt using a square lever.
- Take out the engine belt.
- Insert the new belt.



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

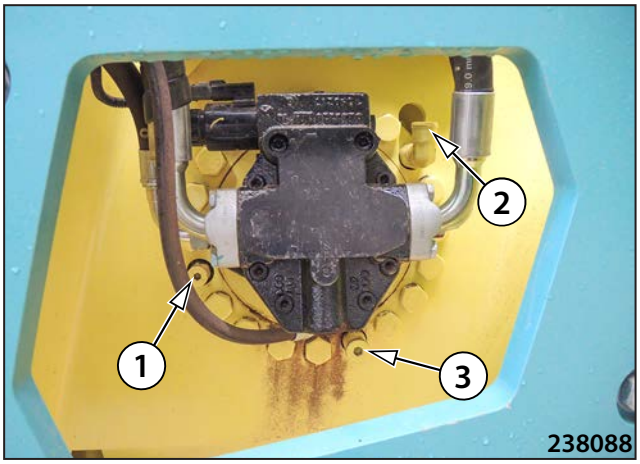
3.6.32 Oil change in travel gearboxes



Carry out for the first time after 100 hours

(Wheel) axle gearboxes

- Place the machine horizontally on a flat and solid surface so that the plugs of the gearboxes of the axle are in the position according to the picture.
- Clean surfaces around the plugs.
- Put a suitable pan under the drain plug (1).
- Remove both plugs and clean them, and let the oil drain out.
- After draining the oil, remount the drain plug (1) and replace the damaged seal.
- Refill the oil through the upper plug (2) until the level reaches the check hole (2) or the oil starts flowing out.
- Replace both of the plugs, change the plug seals if damaged.



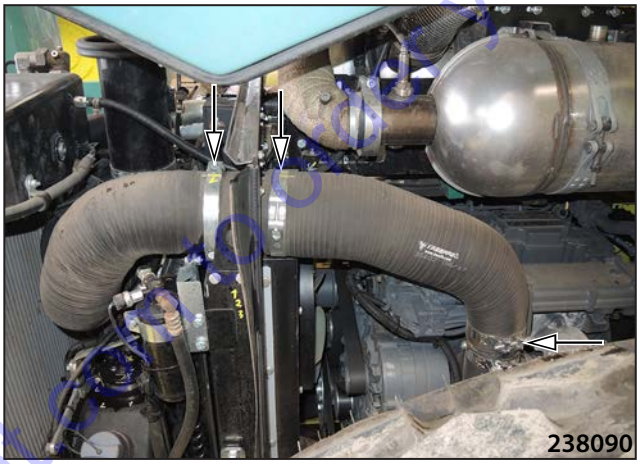
Drum gearbox – right side

- Place the machine onto a flat, solid surface.
- Clean surfaces around the plugs.
- Put a suitable pan under the drain plug (3).
- Clean surfaces around the plugs.
- Put a suitable pan under the drain plug (3).
- Unscrew all plugs (1), (2), (3) and let the oil drain out.
- Remount the drain plug (3) after the draining is completed.
- Fill the recommended oil through the filler plug (2).
- Check the oil level in the inspection hole (1). The oil must reach the lower edge of the opening or slightly flow out.
- Mount the plugs (1) and (2), replace damaged plug seals.

Do not touch the gearbox and adjacent parts if they are hot.

3.6.33 Checking the intake pipe of the engine

- Check the engine inlet 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.

3.6.34 Checking the batteries

- Stop the engine and use the disconnector to disconnect the wiring.

- Clean the battery surface.
- Check the condition of the terminals and clamps. Clean the terminals and clamps. Apply a thin layer of grease on the terminals.
- If a maintenance-free battery is installed in the machine, it is not necessary to check the electrolyte level and refill the electrolyte for the entire service life of the battery. Consult the condition of battery discharge – the lowest permissible voltage level (measured on the battery terminals), under which the battery could be damaged, and the charging procedure with the battery manufacturer.

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, 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.

Battery charging generates hydrogen. Avoid sparks and fire, there is a risk of explosion!

Keep the battery dry and clean.

Charge the battery if it is low.

Remove the battery from the machine to charge.

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.

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.

3.6.35 Checking the engine

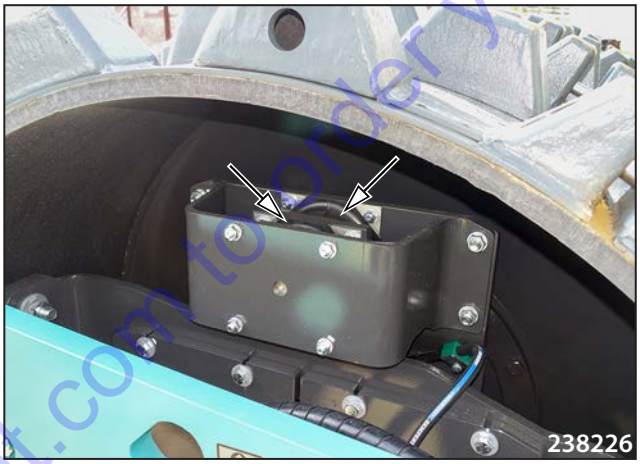
- Check the engine for mounting in the machine frame.
- Recheck the rubber-metals for condition and for rubber-to-metal bond strength.
- Replace if damaged.
- Recheck screws and nuts for tightening.
- Check the engine. Replace damaged parts.
- Check the clamps and the hose connections.

3.6.36 Damping system check

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

Shock-absorbing system of the drum.

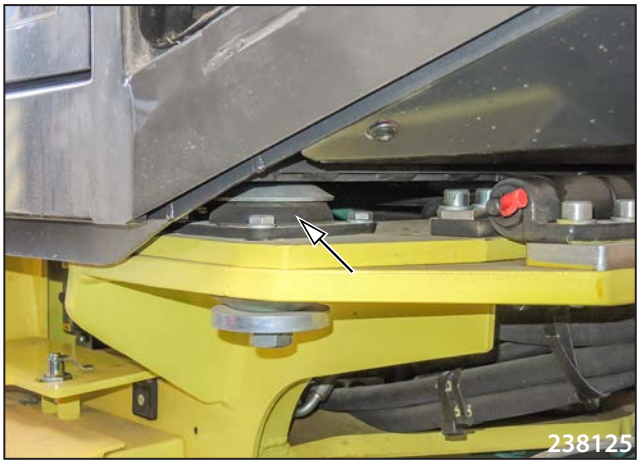
Rubber-metal (D)
Order number: 4-9200000030



Rubber-metal (HX)
Order number: 4-9200000031

Rubber-metals of the driver's stand – upper.

Rubber-metal
Order number: 1402721

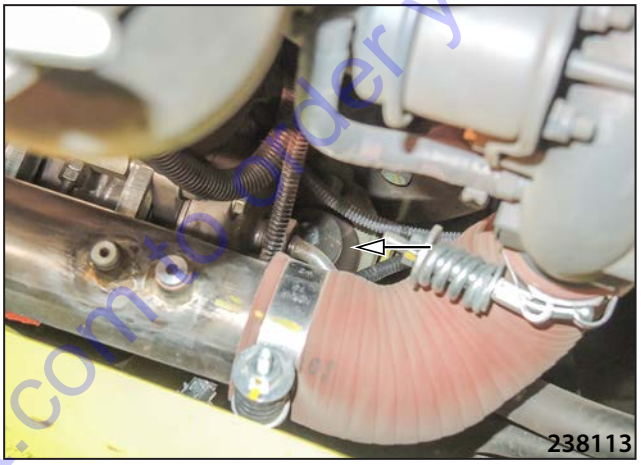


Rubber-metals of the driver's stand – lower.

Rubber-metal
Order number: 1403130

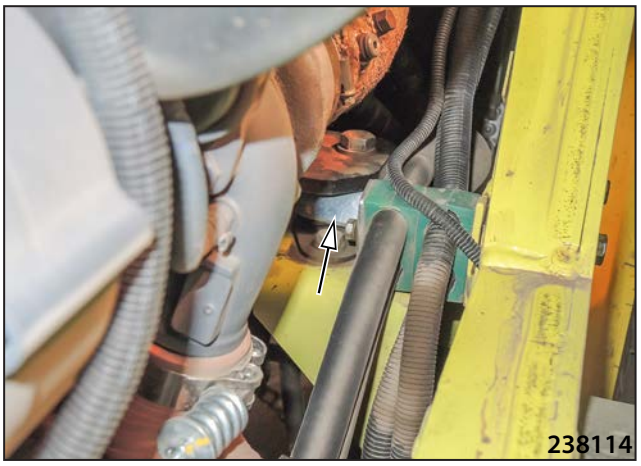
Rubber-metals of the engine.

Rubber-metal
Order number: 1317353



Rubber-metals of the engine.

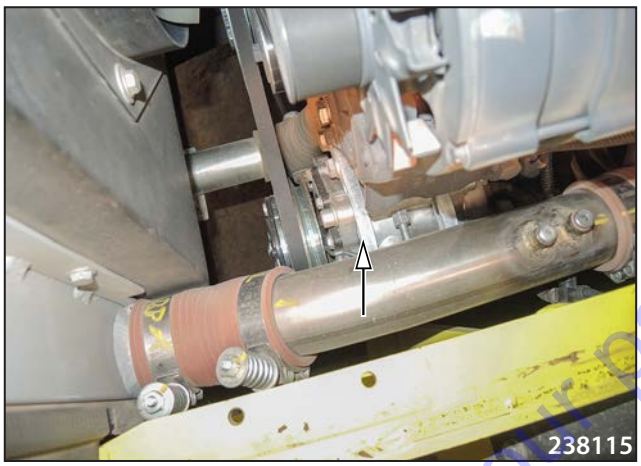
Rubber-metal
Order number: 1221077



Replace if damaged.

Recheck screws and nuts for tightening.

3.6.37 Checking the air-conditioning compressor for mounting



- Check the compressor and the compressor bracket for strength of attachment. Check that the belt does not slip. Retighten the screws if needed.

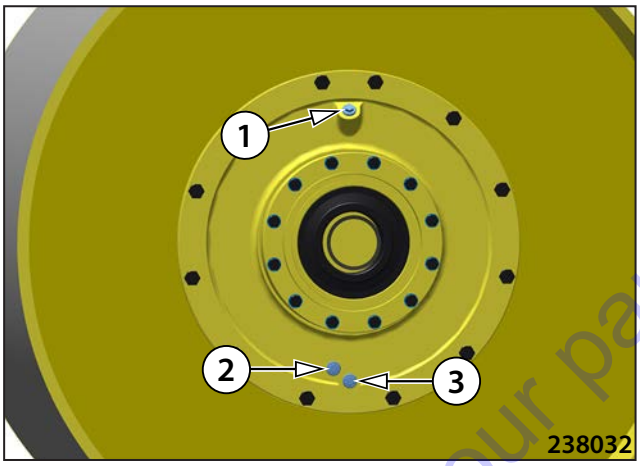
3.6.38 Engine and machine diagnostics

Contact the authorized Deutz service centre for diagnostics of the engine.

Contact your dealer for diagnostics of the machine.

Every 2,000 hours of operation

3.6.39 Oil change in the vibrator



Check for the first time after 500 hours.

- Place the machine horizontally on a solid and flat surface so that the drain plug on the left side of the drum (3) is in the lowest position and the filler plug (1) in the highest position.
- Place a suitable pan under the drain hole.
- Unscrew all the plugs and let the oil flow out.
- Remount the drain plug (3) after the draining is completed.
- Through the filler (1), refill the recommended oil up to the edge of the inspection hole (2).
- Mount the other plugs.

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

Change the oil when it is warm.
Refill the same type of oil.

Stop the oil soaking into the ground.

3.6.40 Cleaning and checking the air-conditioning system

- Replace the filter dehydrator.
- Have the individual components and wiring checked and the air-conditioning system cleaned (moulds and bacteria removed) by an authorized company.
- When working in a very dusty environment, the check must be carried out in shorter intervals.

3.6.41 Hydraulic oil and filter replacement

Drain the oil when cooled down below 50 °C (122 °F).
Follow the fire fighting measures!

Change the oil before the season starts, or after a long shut-down of the machine. At the same time, clean the suction filter.

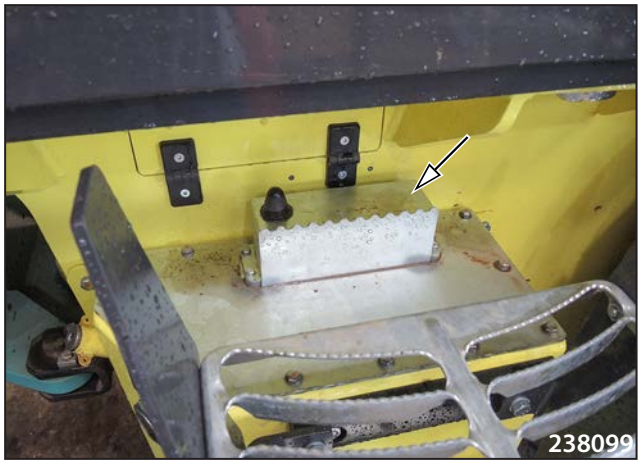
When disconnecting the hydraulic circuits, blind all of holes with plugs.

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

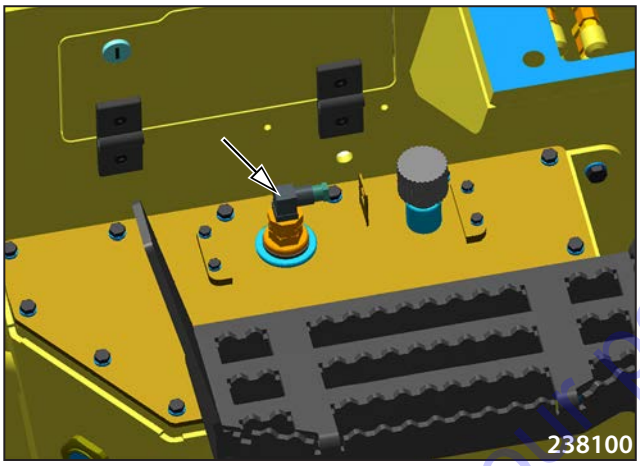
The used oil is ecologically hazardous waste – hand it over for disposal.

- Remove the plug. Let the hydraulic oil drain out into the prepared pan. The drained volume is 76 l (20.1 gal US)

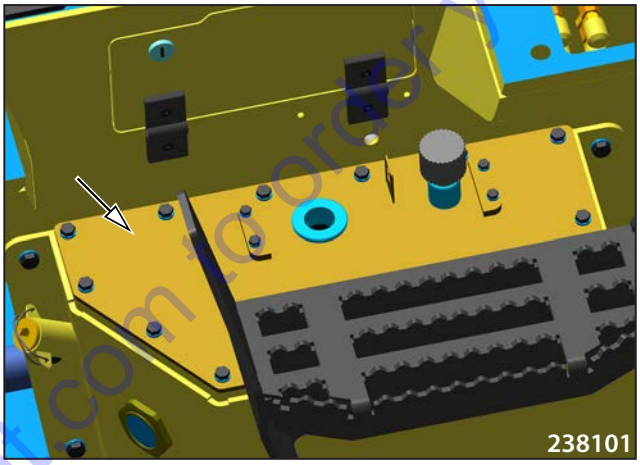
- Remove the cover.



- Remove the connector of the level gauge.

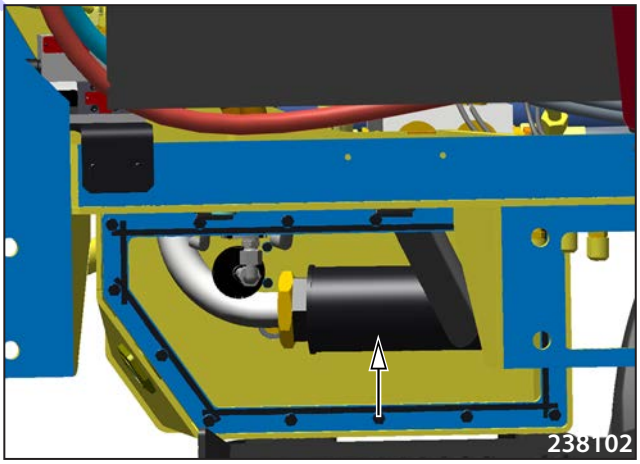


- Remove the cap.



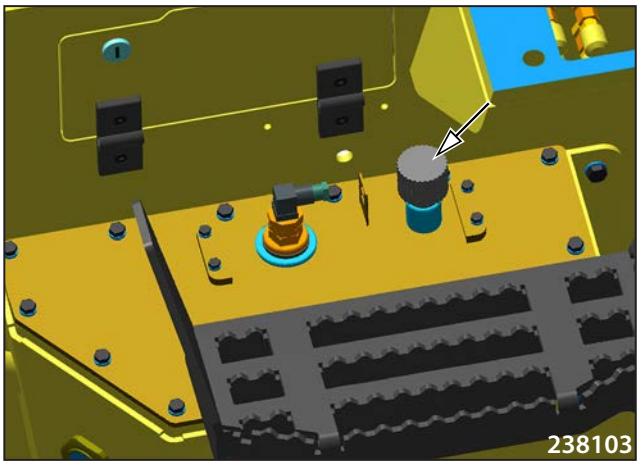
- Remove the suction basket.
- Clean the suction basket.
- Remount the suction basket.
- Inspect the interior of the tank.
- If the bottom is dirty, clean and rinse the tank carefully with the new oil.
- Mount the lid back.
- Use the new sealing tape.

Sealing strip
Order number: 4-5422250006



- Remount the connector of the level gauge.

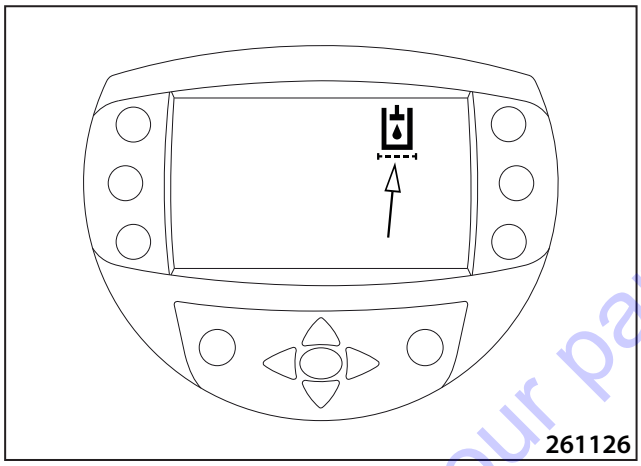
- Remove the ventilation filter. Mount a new ventilation filter.
- Mount the cover back.



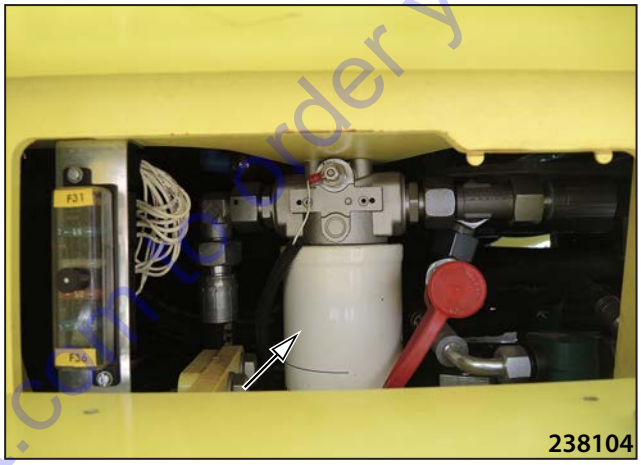
Pressure filter element replacement

Always carry out the replacement:

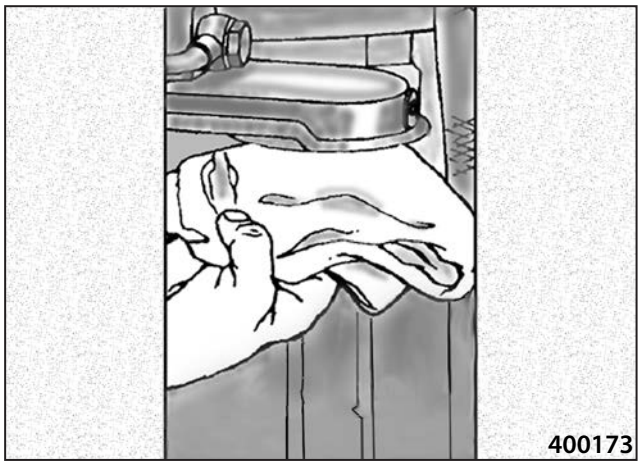
- **when changing oil**
- **when the indicator lamp for the pressure filter lights up because the operating temperature of the oil ranges between 50 and 60°C (122–140°F).**



- Remove the filter.

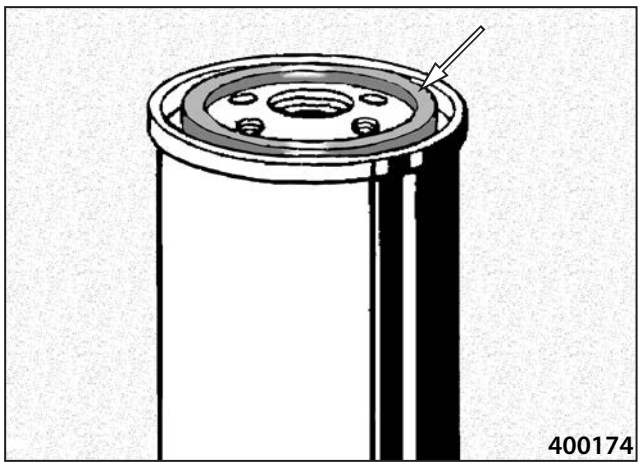


- Clean the seating surface underneath.



- Check the seal ring for condition.
- Lubricate the ring with clean oil.
- Mount the new filter.

Filter cartridge
Order number: 4-5358520121



Always change the oil and replace the filter when inner parts of the units (hydraulic motors, hydraulic generators) were destroyed, or after a major repair of the hydraulic system. Clean and rinse out the hydraulic tank before mounting the new unit and refill with oil. When the engine is running at a higher speed, test functions of the machine. Check for leakage.

Use only original filter elements according to the spare parts catalogue.

Used filter cartridges are ecologically hazardous waste – hand them over for disposal.

Filling the hydraulic circuit:

- Fill using the hydraulic unit.
- You can order the hydraulic unit from the machine manufacturer.

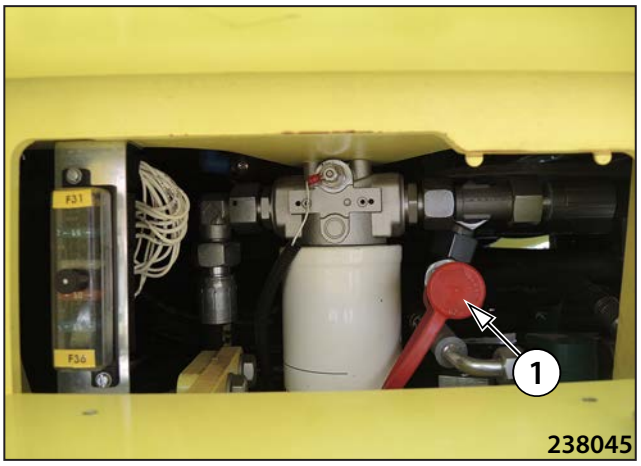
Hydraulic unit 230 V
Order number: 1251998

Hydraulic unit 110 V
Order number: 1255297

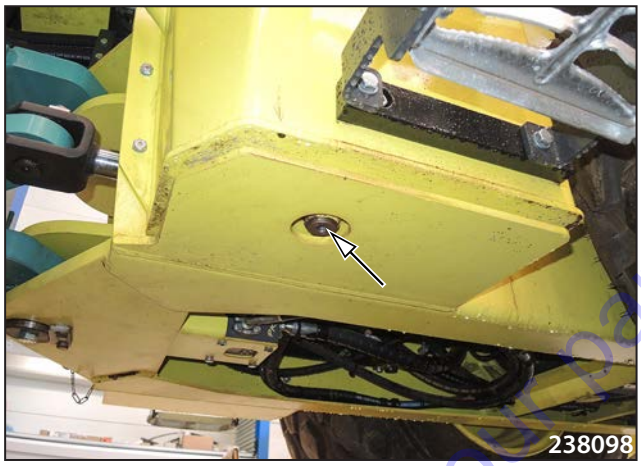
Note

The hydraulic unit 230 V is intended for operation in 230 Volt networks (Europe), the hydraulic unit 110 V is intended for operation in 110 Volt networks (North America).

- Remove the cap of the filling end piece and put the quick-coupler of the filling device onto the quick-coupler (1). Fill the hydraulic circuit until the clean oil starts flowing out from the tank. Catch the oil in a clean pan.



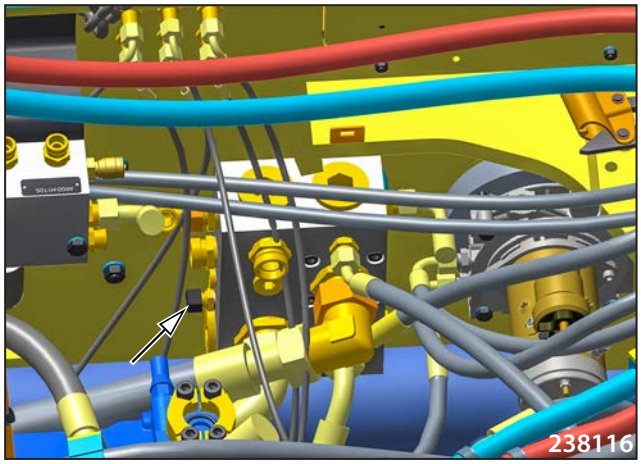
- Allow approximately 15 litres (4 gal US) to drain to remove any impurities from the tank and mount the plug.



- Fill up the tank with the oil to the maximum level and disconnect the filling device.

Checking the oil thermometer sensor:

- Remove the sensor and clean the contact.
- Immerse the sensor into warm oil of a known temperature and read the temperature on the hydraulic oil thermometer; if the sensor operation is incorrect, replace the sensor with a new one.



Temperature sensor
Order number: 1234999

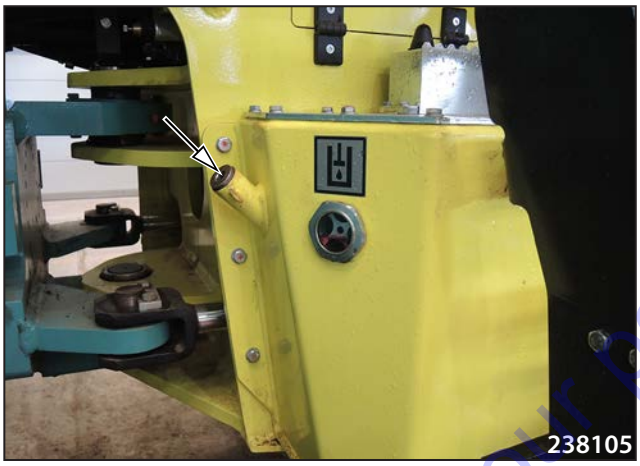
Fill the hydraulic circuit through the filler neck only in emergency!

When filled in this way, the next change interval must be reduced to half, i.e. 1,000 hours or 1 year.

The plug of the tank filler is sealed. If this seal is broken during the guarantee period, the guarantee will expire.

Maintain cleanliness at work. Avoid contaminating the system with materials that may damage important units! Do not open the hydraulic tank uselessly! For cleaning the tank, use agents, which do not release fibres, and do not use chemical detergents. Fill with the oil according to chapter 3.2.4.

- Fill the tank with the specified type of oil through the filler neck.



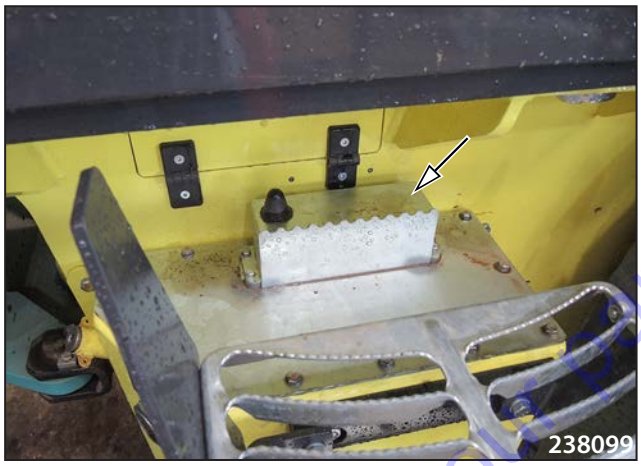
Note

When the tank is refilled through the neck, a large portion of the old dirty oil remains in the circuit and the life cycle of the hydraulic units will be shorter.

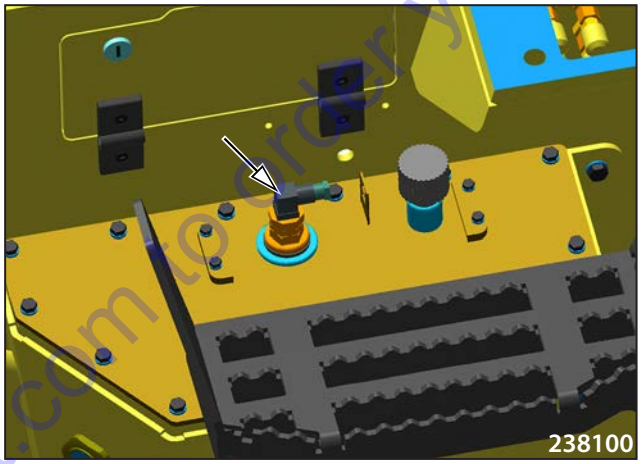
3.6.42 Cleaning of the suction filter of the cab lifting and lowering unit

Clean while changing the hydraulic oil.

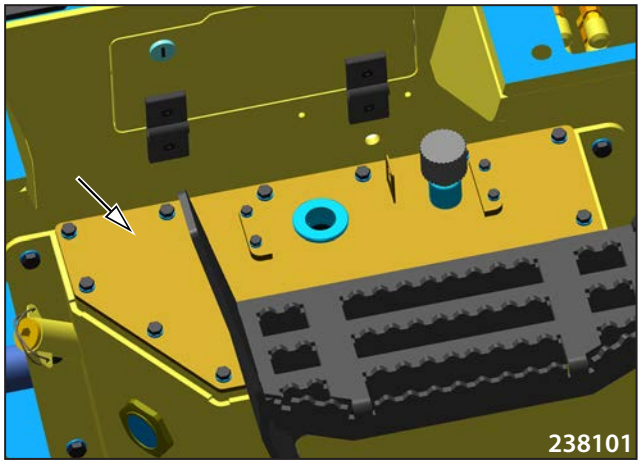
- Remove the cover.



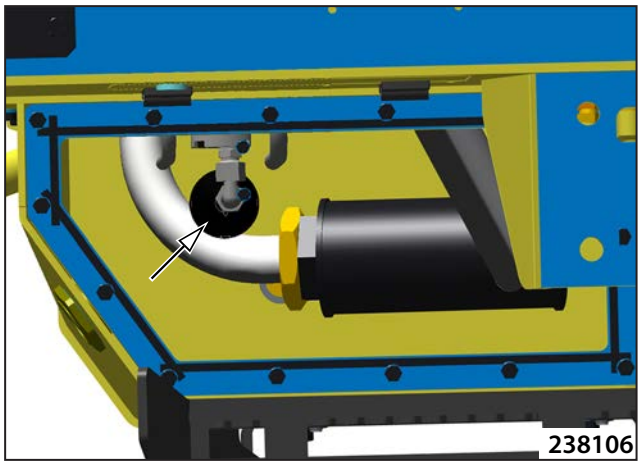
- Remove the connector of the level gauge.



- Remove the cap of the hydraulic tank.



- Remove the filter.
- Clean the filter.
- Remount the filter.



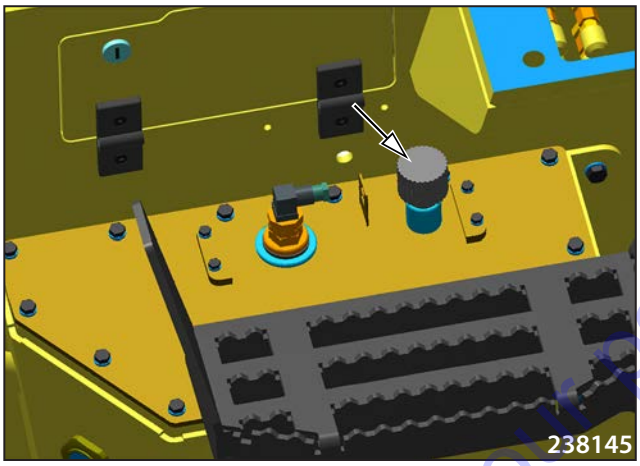
Stop the oil soaking into the ground!

Mount the cap of the hydraulic tank.

Mount the connector of the level gauge.

Mount a new ventilation filter.

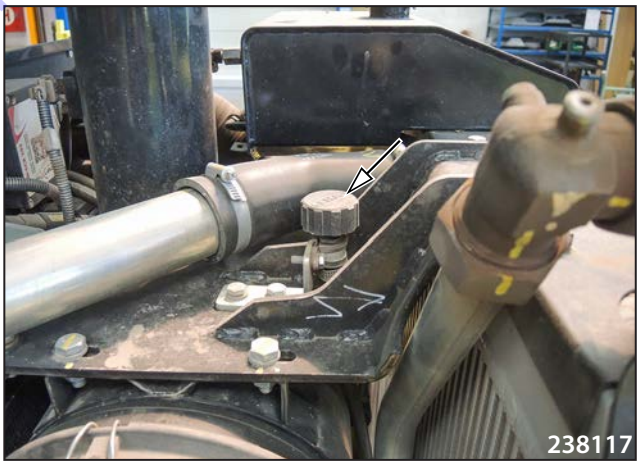
Ventilation filter
Order number: 1280287



3.6.43 Vent plug replacement

- Remove the vent plug.
- Mount the new vent plug.

Vent plug
Order number: 1281431

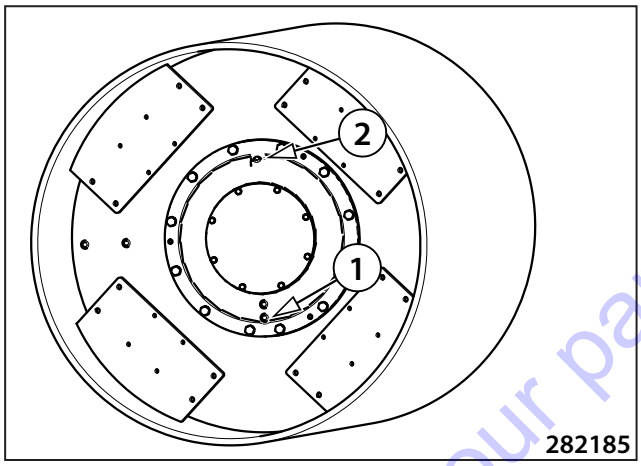


3.6.44 Replacement of ACE oil

Draining procedure

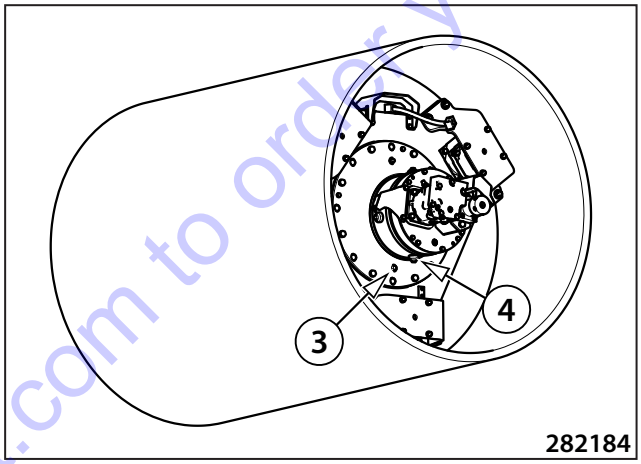
Right side:

- Move the machine so that the plug (2) is in the highest position.
- Remove the drain plug (1).
- Allow the oil to drain into a prepared container.



Left side:

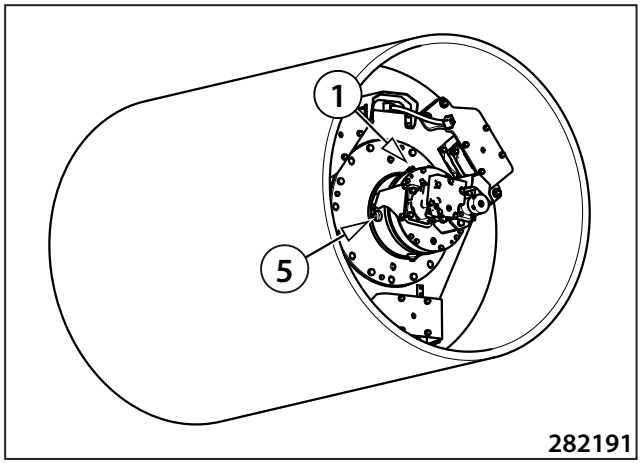
- Remove the drain plugs (3) and (4) and allow the oil to drain into a prepared container.
- The total volume of the drained oil is 25.5 l (6.74 gal US).
- Reinstall the plugs (1), (3) and (4), replace damaged plug seals.
- Replace the filters according to section 3.6.29 Replacement of ACE filters.



Filling process

Left side:

- Remove the plug (1). Fill with 5 l (1.32 gal US) of oil.
- The level must reach the inspection hole (5) or flow out slightly.



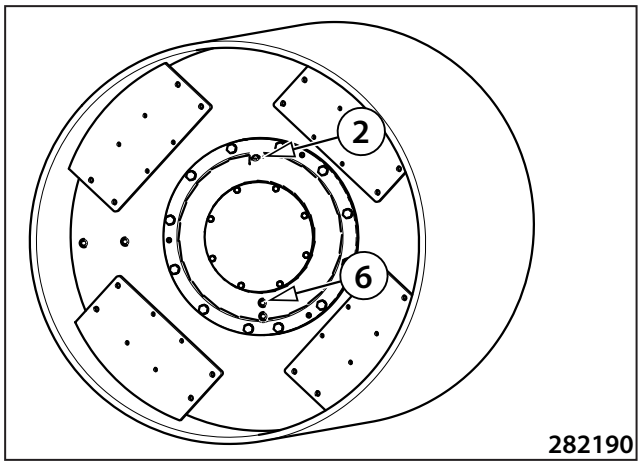
Right side:

- Remove the plug (2) and fill the remaining amount of oil.
- The level must reach the inspection hole (6) or flow out slightly.
- Drive the machine a few metres, then check the oil level from both sides.

Change the oil when the oil is warm, preferably after you stop using the machine.

Allow the drained oil to cool below 50 °C (122 °F).

Refill the same type of oil.



Prevent oil from soaking into the ground.

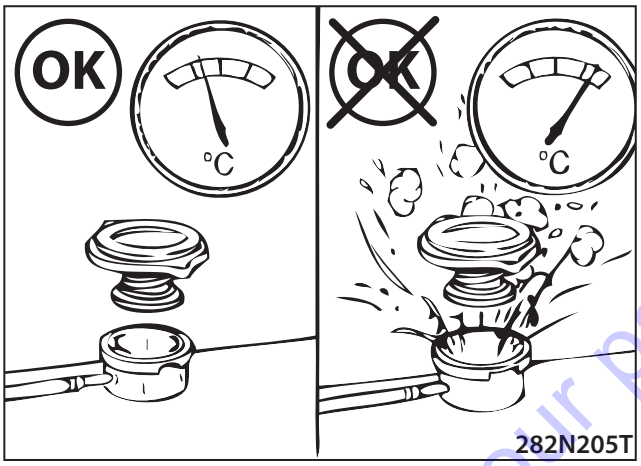
Every 6,000 hours of operation

3.6.45 Coolant change

Draining the cooling circuit:

Before draining the coolant from the cooling circuit let the engine run for 5 minutes so that the liquid temperature can reach 50 °C (122 °F).

Do not open the pressure plug before the coolant temperature drops below 50 °C (122 °F). Beware of gushing of the coolant and scalding when opening the pressure plug.

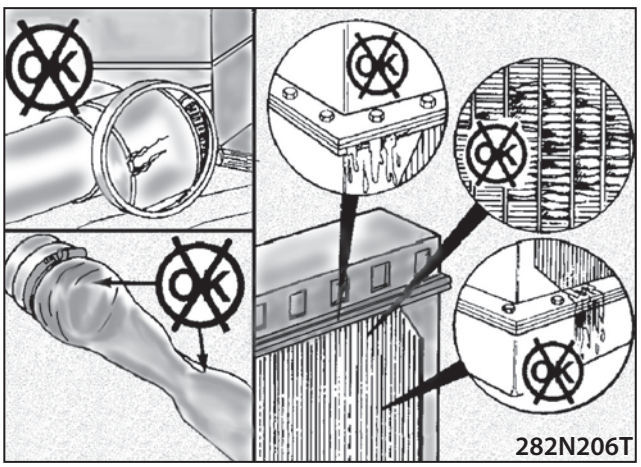


- Open the cooling system by removing the overpressure plug on the expansion tank.

- Stop the engine.
- Remove the drain plug.
- Let the fluid drain into the prepared pans.
- The drained volume is about 32.5 l (8.6 gal US).

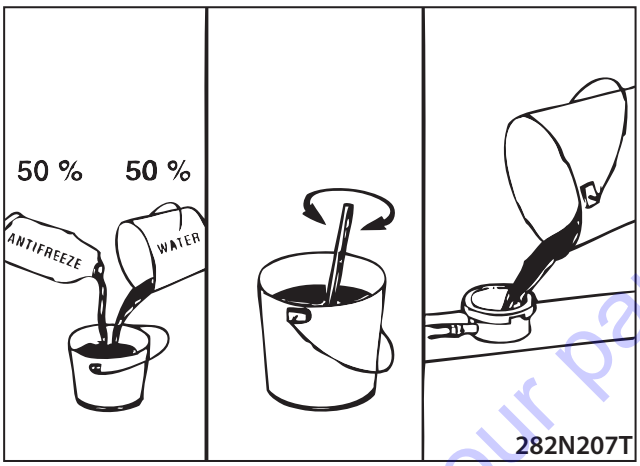
Note

Check the cooling system for defective hoses and missing hose clips. Check the cooler for damage and leakage and the cooling fins for clogging. Clean and repair it, if necessary.



Fill the cooling circuit

- Mount the drain plug and fill the cooling system with the new coolant with the minimum ratio of 50 % water + 50 % antifreeze agent.



Wear gloves to protect your hands!

Protect your eyes with safety glasses or face shield!

Fill with the coolant according to chapter 3.2.3!

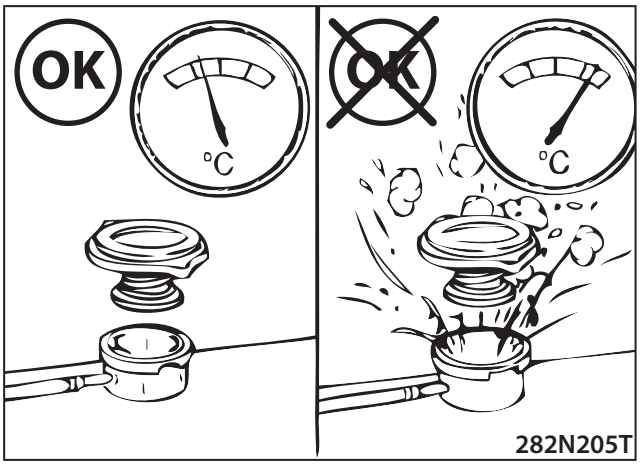
When changing coolant, follow instructions of the anti-freeze manufacturer!

- Refill the coolant to the maximum level. After filling, wait for about 2–3 minutes until the air escapes and the circuit is filled. The appropriate filling rate is 19 l/min [5 gal US/min]. Close the expansion tank with the overpressure plug.

Start the engine and wait until the temperature reaches 82 °C (180 °F). While waiting, check the coolant for leakage and the level on the indicator.

- Stop the engine.
- Check the level on the water gauge. If the level is low, refill the coolant to maximum.

Do not open the pressure plug before the coolant temperature drops below 50 °C (122 °F). Beware of gushing of the coolant and scalding when opening the pressure plug.



Catch the used liquid and hand it over for safe disposal in accordance with regulations!

Maintenance as required

3.6.46 Fuel system venting

- Vent the fuel system before the first start in the following cases:
  - replacement of the fine filter,
  - replacement of the fuel pump,
  - long-term shut-down of the machine,
  - when the tank is empty.

Deaerating:

- Turn the ignition key to the "I" position.
- Leave the pump running until it stops.
- Turn the key to the "0" position.
- Repeat this procedure at least twice.

Do not smoke while working!

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

Catch the escaping fuel!

3.6.47 Regeneration of clogged SCR (Selective Catalytic Reduction) catalyst

- Regeneration is a special engine mode, during which the machine cannot be used.
- Regeneration is made through dissolution of DEF (AdBlue) crystals in the SCR catalyst.
- The regeneration is fully controlled by the engine control unit and it is recommended to wait until the regeneration process is completed.

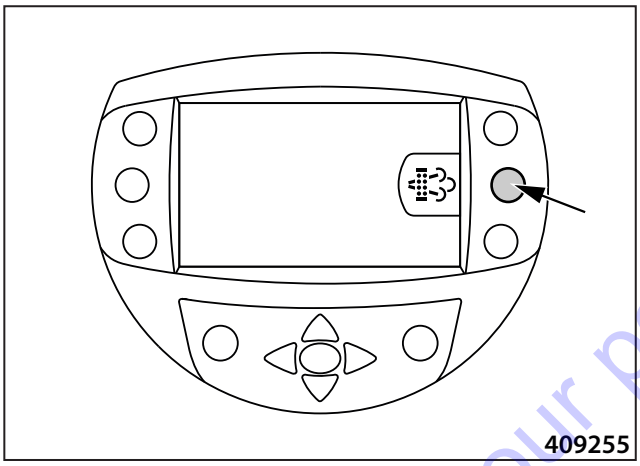
	Conditions for start of regeneration	Indication lamp of SCR catalyst clogging  AMN118	Engine failure indicator lamp  AMN47	Sound signal	Machine reactions
Normal operation	No need for regeneration	Off	no	no	No
Crystallisation detection	Machine at standstill and regeneration button	Flashing slowly 0.5 Hz	no	no	No
Crystallisation detection warning	Machine at standstill and regeneration button	Flashing slowly 0.5 Hz	lighting	Yes	Engine output reduced by 25 %
Crystallisation detection OFF	Machine idle and service tools required	Flashing rapidly 3 Hz	Flashing	Yes	Output reduced to 50 % + max. engine speed reduced to 1300 rpm.

Regeneration conditions:

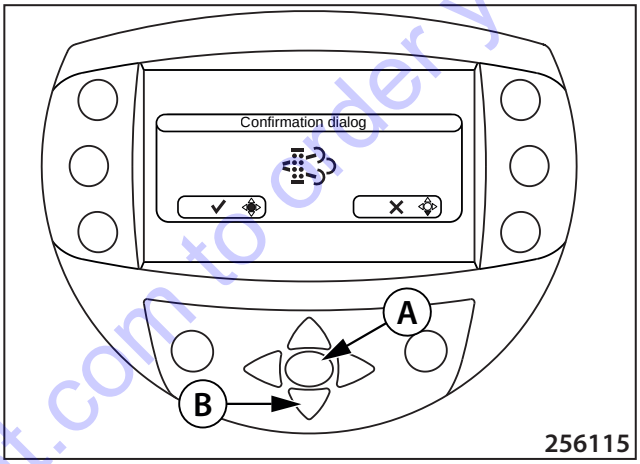
- park the machine at a safe area,
- the travel control level in the brake position,
- coolant temperature >70 °C,
- sufficient fuel volume – about 20 l (5.3 gal US),
- sufficient volume of DEF (AdBlue) (Diesel exhaust fluid) – about 1 l (0.26 gal US).

Start of regeneration:

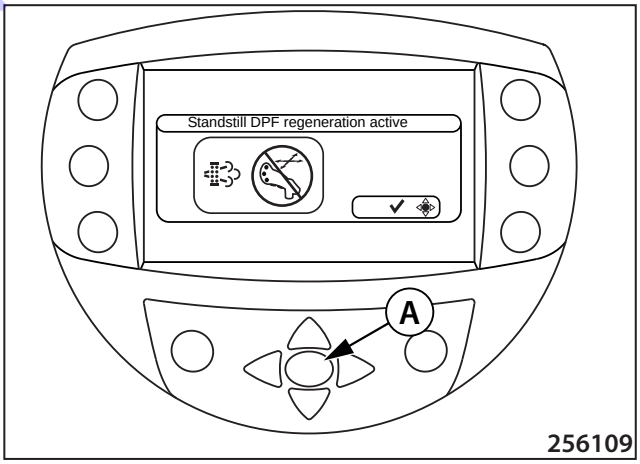
- Press the SCR catalyst regeneration button.



- After you press the regeneration button, a confirmation dialog will appear.
- Press the middle button (A) to confirm the start of the SCR catalyst regeneration.
- Press the lower button (B) to cancel the start of the SCR catalyst regeneration.



- After the start of the SCR catalyst regeneration is confirmed, the following information dialog will appear:
  - SCR catalyst regeneration enabled,
  - it is forbidden to move with the travel control.



Note

The dialog will appear when the SCR catalyst regeneration is started or if the function is enabled and the operator has not pressed any button for more than 60 seconds.

The dialog can be confirmed by pressing the middle button (A).

Progress of regeneration:

- automatic increase of engine speed (about 1,800 rpm),
- regeneration duration 40-50 min.

End of regeneration:

- automatic decrease of engine speed (about 1,000 rpm),
- regeneration and warning indication lamp goes off.

3.6.48 Cooler cleaning

- Considering various working conditions, no regular cleaning interval can be specified.
- When working in a very dusty environment, carry out the cleaning daily. The cooler clogging results in reduced cooling effect and increased temperatures of the engine coolant and hydraulic oil.
- Clean with compressed air or pressure water (steam). Clean in the direction from the fan side.

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!

Do not use forbidden cleaning agents!

3.6.49 Machine cleaning

- Clean the machine from big impurities after completing the work.
- Clean the whole machine completely on regular basis, at least once a week. When working on cohesive soils, cement and lime stabilizations, clean the machine completely every day.

Disconnect the battery disconnector.

Clean with the engine stopped.

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

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.).

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!

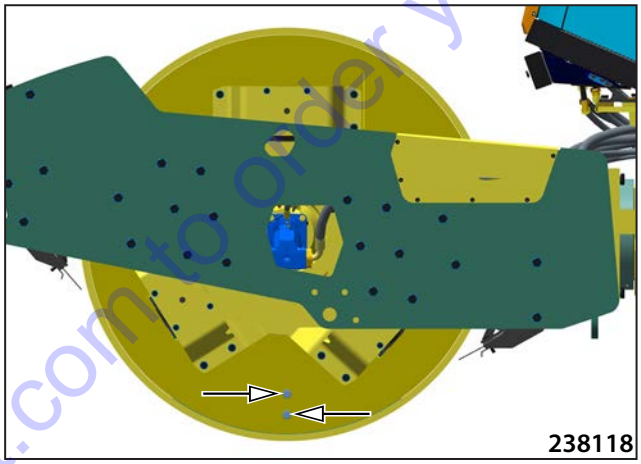
Do not use forbidden cleaning agents!

3.6.50 Scraper adjustment

- Adjust the scrapers according to chap. 2.7.11 if required.

3.6.51 Drum coolant

- The drum coolant is a lifetime refill and is not to be replaced. The lower plug is used for draining the refill; the upper plug for filling and checking the refill level. When draining, drive the drum so that the drum is inclined and the plugs in their lowest positions to drain the coolant. To fill the drum, drive the machine on so that the plugs are in the opposite positions (up). Fill with the coolant volume according to Chapter 3.2.9.



NEVER operate the machine without the water refill of the drum!

3.6.52 Rear-view mirrors

Before driving the machine, the machine operator (driver) must clean and adjust the external rear view mirrors so that they can clearly see the area behind the machine even when the machine is moving.

It is forbidden to operate the machine without the external rear view mirrors!

Always clean and adjust the external rear view mirrors when the machine is stationary and secured against unintentional movement!

Clean and adjust the external rear view mirrors from the ground or from the driver's stand!

3.6.53 Charging of the battery

- Remove the battery from the machine to charge.
- 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.

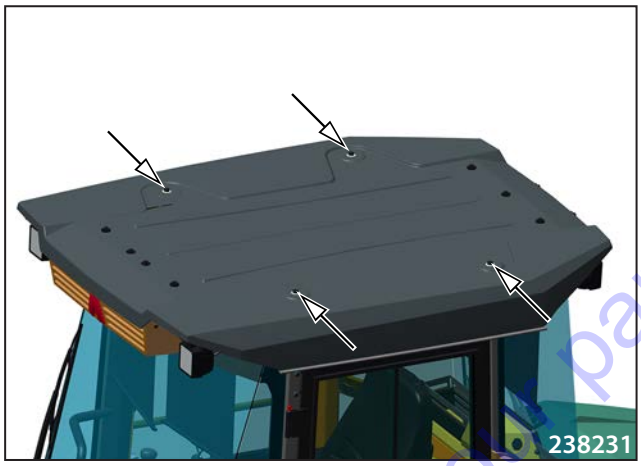
Never make direct conductive connection between both poles of the battery to avoid a short circuit and a risk of explosion of the battery.

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.

3.6.54 Checking the tightness of screw connections of the cab



- Regularly check the tightness of the screw connections of the cab. Replace seals if leaking.

Screw tightening torque 10 Nm (7.4 lb-ft).

Sealing
Order number: 1278862

3.6.55 Checking the screw connections for tightening

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

	Tightening torque			
	For screws 8.8 (8G)		For screws 10.9 (10K)	
Thread	Nm	lb ft	Nm	lb ft
M6	10	7.4	14	10.3
M8	24	25.0	34	25.0
M8×1	19	14.0	27	19.9
M10	48	35.4	67	49.4
M10×1.25	38	28.0	54	39.8
M12	83	61.2	117	86.2
M12×1.25	66	48.7	94	69.3
M14	132	97.3	185	136.4
M14×1.5	106	78.2	148	109.1
M16	200	147.5	285	210.2
M16×1.5	160	118.0	228	168.1
M18	275	202.8	390	287.6

	Tightening torque			
	For screws 8.8 (8G)		For screws 10.9 (10K)	
Thread	Nm	lb ft	Nm	lb ft
M18×1.5	220	162.2	312	230.1
M20	390	287.6	550	405.6
M20×1.5	312	230.1	440	324.5
M22	530	390.9	745	549.4
M22×1.5	425	313.4	590	435.1
M24	675	497.8	950	700.6
M24×2	540	398.2	760	560.5
M27	995	733.8	1400	1032.5
M27×2	795	586.3	1120	826.0
M30	1350	995.7	1900	1401.3
M30×2	1080	796.5	1520	1121.0

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

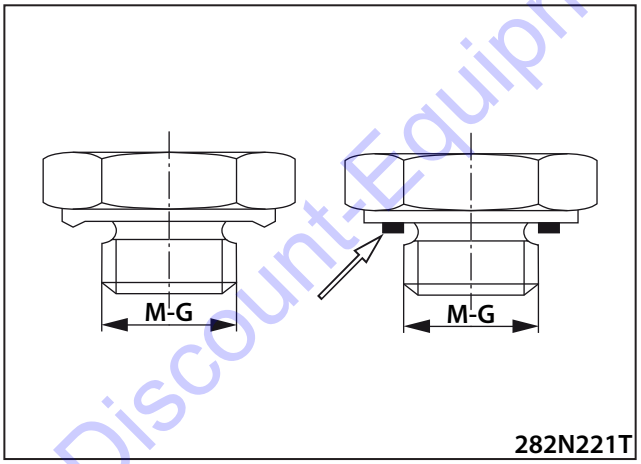
			Tightening torques of cap nuts with O-rings – hoses					
			Nm			lb ft		
Spanner size	Thread	Pipe	Nominal	Min	Max	Nominal	Min	Max
14	12×1.5	6	20	15	25	15	11	18
17	14×1.5	8	38	30	45	28	22	33
19	16×1.5	8	45	38	52	33	28	38
		10						
22	18×1.5	10	51	43	58	38	32	43
		12						
24	20×1.5	12	58	50	65	43	37	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						

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

	Neck tightening torques	
G-M	**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 11/4	600	443
G 11/2	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

	Plug tightening torques	
G-M	**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 11/4	600	443
G 11/2	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



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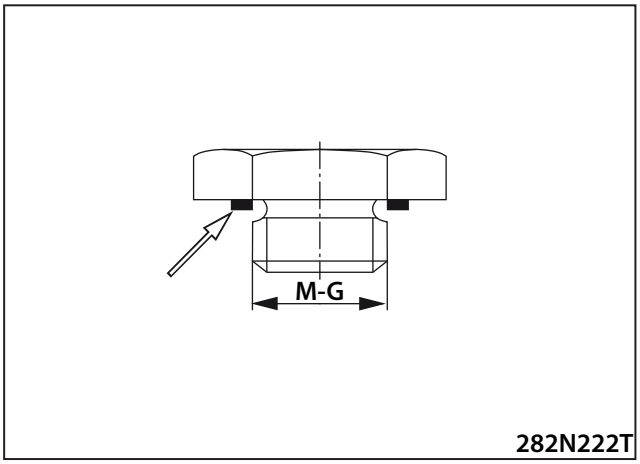

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3.7 Troubleshooting

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 and electrical systems; therefore contact the service department of an authorised dealer or the manufacturer for troubleshooting.

3.7.1 Machine errors

Error number BODAS/ HEX	Name	Troubleshooting
8000	CAN1	Contact Technical Support
8001	VB_High	Contact Technical Support
8002	VB_Low	Check the battery
8003	Engine shut down	"Refuel Bleed the fuel system Contact Technical Support "
8004	-	-
8005	-	-
8006	VSS1	Contact technical support
8007	VSS2	Contact Technical Support
8008	VSS3	Contact Technical Support
8009	VP1	"Check machine fuses Check the battery Contact technical support "
800A	Emergency stop	"Deactivate Stop button Remove and turn on the ignition key of the machine and start Contact technical support "
800B	VP2	"Check machine fuses Check the battery Contact technical support "
800C	Engine high rpm	Engine overrevving due to steep deceleration on a slope
800D	Drive pump high current	Contact Technical Support
8011	No CAN message from Engine	Contact Technical Support
8012	No CAN message from Lever	"Check machine fuses Contact Technical Support "
8013	No CAN message from Coolant temp	Contact Technical Support
8014	No CAN message from Lever 2nd Ch	Contact Technical Support
8016	Inhibit is actived	Contact Technical Support
8017	Lever CRC mismatched	Contact technical support
8019	Redundant lever position unmatch	Contact Technical Support
801A	Lever direction and movement unmatch	"The machine slowly descends under its own weight on a steep hill to the opposite side to the tilted control lever Contact Technical Support "
801B	Hydraulic oil level is low	"Check the hydraulic oil level (Applies to machines equipped with an oil level sensor) Contact technical support "
801C	Brake status and switch unmatch	Contact technical support
801D	Level is in N posit but it moves	"The machine tried to stand using the dynamic brake Contact technical support "
801E	Drive currents uncalibrated	Contact technical support
801F	Machine speed unmatch	Contact technical support
8023	CAN2	Contact Technical Support
8024	CAN3	Contact Technical Support
8025	SW-Inhibit is actived	Contact Technical Support

The texts are given only in the original language version or as a translation of the original into the English language version.

3.7 Troubleshooting

Error number BODAS/ HEX	Name	Troubleshooting
8027	RC unit ovetemperature	"Stop and let the machine cool down Contact Technical Support "
8028	RC unit undertemperate	"Warm up the machine to -40C Contact Technical Support "
8029	Service button is activated	Service mode is activated See documentation "Service button"
802A	Wrong speed sensor	Contact technical support
802B	Wrong Fuel tank calib parameter	Contact technical support
802E	Passive errors erased	-
802F	NV memory writing error	Contact technical support
8030	Lever data inconsistent	Contact technical support
8031	Hydraulic oil temp is low	"Warm up the machine Contact Technical Support "
8032	Engine coolant temp is low	"Keep the engine running or warm it up by driving slowly Contact technical support "
8049	No Telematic	Telematics unit not fitted Contact Technical Support
804A	Vibration frequency unmatch	"Check the vibration frequency sensor on the tread Contact technical support "
804B	Engine coolant level low	"Refill engine coolant Contact technical support "
804C	Water in fuel	"Water in diesel fuel Contact technical support "
804D	Air Filter Clogged	"Clean the air intake filter Contact technical support "
8310	SF1-Starting Con- ditions	"Active engine start blockage Contact technical support "
8311	SF1 1-Engine Start	"Lever in PB Deactivate service button Contact technical support "
8312	SF1 2-Lever Auto- detection	Contact technical support
8320	SF2 - EMCY Brake, Engine Stop	Contact Technical Support
8321	SF2 1-Pump coil diag	Contact Technical Support
8322	SF2 2-Operator Detection	"Lever to PB Contact Technical Support "
8323	SF2 3-EMCY Stop	"Deactivate emergency button Remove and turn on the ignition key of the machine and start Contact technical support "
8325	SF2 5-Lever Pos Validation	Contact technical support
8326	SF2 6-ParkBrake Coil diag	Contact technical support
8328	SF2 8-Decel monitor	Contact technical support
8330	SF3-Soft Brake, Engine runs	
8332	SF3 2-Operator Detection	"Lever to PB Contact Technical Support "
8334	SF3 4-Hydraulic oil Overtemp	"Let the machine cool down Contact Technical Support "
8335	SF3 5-HOil Temp Sensor diag	Contact Technical Support
8340	SF4-EMCY Brake,Engine runs	

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Error number BODAS/ HEX	Name	Troubleshooting
8341	SF4 1-Lever CAN validation	Contact technical support
8342	SF4 2-ParkBrake monitor	Contact Technical Support
8343	SF4 3-PASD movement monitor	"Lever to PB Contact Technical Support "
8344	SF4 4-Direction monitor	"Lever to PB Contact Technical Support "
8345	SF4 5-RPM Sensor diag	Contact Technical Support
8346	SF4 6-Panic on lever	"Lever to PB Contact Technical Support "
8350	SF5-Speed Reduction	
8351	SF5 1-Hydraulic oil temp monitor	Contact Technical Support
8360	SF6-PASD activation	
8361	SF6 1-ParkBrake movement monitor	"Brake Test Contact Technical Support "
8404	NTC H oil temp out of range	Contact Technical Support
8405	Speed sensor out of range	Contact Technical Support
8406	Direction sensor out of range	Contact Technical Support
8407	H oil filter1 out of range	Contact Technical Support
8408	H oil level input out of range	Contact Technical Support
8409	Park brake input out of range	Contact Technical Support
840A	Fuel level sensor out of range	Contact Technical Support
840D	Service switch out of range	Contact Technical Support
840E	Left blinker input out of range	Contact Technical Support
840F	Right blinker input out of range	Contact Technical Support
8412	Speed diag input out of range	Contact Technical Support
8414	Air condition input out of range	Contact Technical Support
8415	Air filter input out of range	Contact Technical Support
8416	Water in fuel input out of range	Contact Technical Support
8417	Coolant level input out range	Contact Technical Support
8600	Forward pump highside error	Contact Technical Support
8601	Reverse pump highside error	Contact Technical Support
8602	Lowside to pump output error	Contact Technical Support
8603	Safety pump output error	Contact Technical Support
8604	Brake valve output error	Contact Technical Support
8605	Brake lights output error	Contact Technical Support
8606	DifLock valve out- put error	Contact Technical Support
8607	Reverze Signal output error	Contact Technical Support
8608	Pump currents unmatched	Contact Technical Support
8609	Pump safout error	Contact Technical Support
860A	Front H motor safout unmatch	Contact Technical Support
860B	Rear L H motor safout unmatch	Contact Technical Support
860C	Rear R H motor safout unmatch	Contact Technical Support
860D	Front Hydromotor output	Contact Technical Support
860E	Left Hydromotor output	Contact Technical Support
860F	Right Hydromotor output	Contact Technical Support
8610	Front Hydromotor SF output	Contact Technical Support
8611	Left Hydromotor SF output	Contact Technical Support

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Error number BODAS/ HEX	Name	Troubleshooting
8612	Right Hydromotor SF output	Contact Technical Support
8613	Front Hydromotor LS output	Contact Technical Support
8614	Left Hydromotor LS output	Contact Technical Support
8615	Right Hydromotor LS output	Contact Technical Support
8640	Engine relay output error	Contact Technical Support
8641	Fan valve output error	Contact Technical Support
8642	Fine front vibr valve output	Contact Technical Support
8643	Rough front vibr valve output	Contact Technical Support
8644	Fine tacho output	Contact Technical Support
8645	Rough tacho output	Contact Technical Support
8646	Blade up valve output	Contact Technical Support
8647	Blade down valve output	Contact Technical Support
8648	Blade floating valve output	Contact Technical Support
8700	ACE system fault	Contact Technical Support
8701	ACE compaction module	Check the CM module fuse Contact Technical Support
8702	ACE parameters	Contact Technical Support
8710	TTC Connection Error	Check TTC module fuse Contact Technical Support
8750	ACE Pro ECU Error	Contact Technical Support
8751	ACE Pro SW Error	Contact Technical Support
8752	ACE Pro Vibration Output	Contact Technical Support
8753	ACE Pro GearBox Inc Output	Contact Technical Support
8754	ACE Pro GearBox Dec Output	Contact Technical Support
8755	ACE Pro GearBox Position Input	Contact Technical Support
8756	ACE Pro Frequency Input	Contact Technical Support
8758	ACE Pro Frequency Control Error	Contact Technical Support
8759	ACE Pro GearBox Control Error	Contact Technical Support
875A	ACE Pro Control Error	Contact Technical Support
875B	ACE Pro Calibration Error	Need to calibrate your ACE system Contact Technical Support
9000	pwron supply VB low	"Recharge the battery Contact Technical Support "
9001	pwron supply VSS	"Recharge the battery Contact Technical Support "
9002	pwron hwmonitor 1	Contact Technical Support
9003	pwron sequence - startcondition	Contact Technical Support
9005	pwron engine speed	"Refuel Bleed the fuel system Check the machine's fuel filter Contact technical support "
9006	pwron hwmonitor 2	Contact technical support
9007	pwron sequence - Imobilizer	"Contact TCU Administrator Contact AMMANN Technical Support "
900A	pwron safout cable brake	Contact technical support
900B	pwron safout short circuit	Contact Technical Support
9010	pwron powerswitch 1	Contact Technical Support
9012	pwron powerswitch 2	Contact Technical Support
9013	pwron reverse power	Contact Technical Support
9014	pwron emergency stopp	Contact Technical Support

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3.7.2 Engine errors

Error codes	SPN	FMI	Error description
8	132	1	„The air mass flow AFS_dm is greater than or equal to AFS_PhysRng.Min_C. Physical range check is low for air mass flow sensor.“
9	172	2	Air inlet filter temperature, plausibility error.
26	523891	14	„When AirHt_ctDefSRCLoOn_mp is lower than AirHt_ctMaxDef_C. DFC to SRC Low error when heater is on.“
28	523953	2	„Healing takes place if the condition for error detection is not present. Air temprature monitoring plausibility check array.“
30	523955	2	„Healing takes place if the condition for error detection is not present. Air temperature monitoring plausibility check array.“
36	523923	3	
37	523924	3	Short circuit to battery error of actuator relay 2.
38	523925	3	Short circuit to battery of actuator relay 3.
40	523927	3	Short circuit to battery of actuator relay 6.
41	523923	4	„Short circuit to ground error. Detailinformation not available.“
42	523924	4	Short circuit to ground of actuator relay 2.
43	523925	4	Short circuit to ground of actuator relay 3.
44	523926	4	Short circuit to ground of actuator relay 4.
45	168	3	Sensor battery voltage error; signal range check is high.
46	168	4	Sensor battery voltage error; signal range check is low.
47	168	2	High battery voltage; warning threshold is exceeded.
48	168	2	High battery voltage; Shot off threshold exceeded.
55	523910	14	„Air pump doesn´t achieve air mass flow setpoint. Burner Control - burner air pump“
56	524013	7	„Burner does not start after several trials (burner flame lost detection). Burner flame unintentional deleted.“
57	524020	14	„Burner Control: Power reduction due to low lambda. Engine power: Not enough oxygen for regeneration.“
58	523911	0	„Burner dosing valve (DV2); Overcurrent at the end of the injection phase.“
59	523911	12	Burner dosing valve (DV2); Powerstage over temperature.
60	523911	3	Burner dosing valve (DV2); Short circuit to battery.
62	523911	4	Burner dosing valve (DV2); Short circuit to ground.
63	523911	11	„Burner dosing valve (DV2); Short circuit high side powerstage.“
64	523912	2	„Burner dosing valve (DV2) downstream pressure sensor; plausibility error.“
66	523912	0	„Physical range check high for burner dosing valve (DV2) downstream pressure; Shut off regeneration.“
69	523912	1	„Physical range check low for burner dosing valve (DV2) downstream pressure; Shut off regeneration. When burner injector is actuated, the measured pressure does not rise above 1250mbar abs (expected: about 2400mbar).“

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Error codes	SPN	FMI	Error description
72	523912	3	„Sensor error burner dosing valve (DV2) downstream pressure sensor; Signal range check high.“
73	523912	4	„For engines < 4l: Throttle valve error, Open load or short cut to battery, blocked valve or wrong control signal for valve. For engines with Burner T4i: Pressure Sensor error after valve (DV2), lower limit reached.“
74	523913	3	„Sensor error glow plug control diagnostic line voltage; Signal range check high.“
75	523913	4	„Sensor error glow plug control diagnostic line voltage; Signal range check low.“
76	523914	5	„Glow plug control; Open load. Water pump control (PWM) only TTCD 6.1/7.8.“
77	523914	12	Glow plug control; Powerstage over temperature.
78	523914	3	„Glow plug control; Short circuit to battery. Water pump control (PWM).“
79	523914	4	„Glow plug control; Short circuit to ground. Water pump control (PWM).“
82	1235	14	„CAN-Bus 2 = CAN_C reports Bus-error (for engines <8L and CV52 it is the engine-CAN@250kbaud). CAN Bus error passive; warning CAN C - engine CAN.“
83	16	0	No detail information.
84	639	14	CAN-Bus 0: „BusOff-Status“
85	1231	14	CAN-Bus 1: „BusOff-Status“
86	1235	14	CAN-Bus 2 = engine bus „BusOff-Status“
87	16	0	BusOff error CAN.
88	102	2	Charged air pressure above warning threshold.
89	102	2	Charged air pressure above shut off threshold.
90	110	2	Defect fault check for absolute plausibility test.
92	110	0	Physical range check high for coolant temperature.
93	110	1	Physical range check low for coolant temperature.
96	110	3	Sensor error coolant temperature; Signal range check high.
97	110	4	Sensor error coolant temperature; Signal range check low.
98	110	0	High coolant temperature; Warning threshold exceeded.
99	110	0	Coolant temperature; System reaction initiated.
101	111	1	Coolant level too low.
106	598	2	Plausibility check for clutch.
121	1109	2	Engine shut off demand ignored.
122	523698	11	Shut off request from supervisory monitoring function.
124	523969	11	Fault entry for override control mode.
125	523717	12	„Timeout error of CAN-transmit-frame AmbCon; Weather environments.“
126	523603	9	„Timeout Error of CAN-receive-frame AMB; Ambient temperature sensor.“
128	3224	9	„Timeout error of CAN-receive-frame AT1IG1; NOX sensor upstream.“
129	3224	2	DLC error of CAN-receive-frame AT1IG1Vol NOX sensor.

Error codes	SPN	FMI	Error description
130	3224	9	„Timeout error of CAN-receive-frame AT1IG1Vol; NOX sensor.“
133	523938	9	„Timeout error (BAM to packet) for CAN-receive-frame AT1IGCVol1.“
134	523939	9	„Broadcast announce message of the calibration message of the upstream catalytic NOx sensor has failed.“
135	523940	9	„Timeout error (PCK2PCK) for CAN-Receive-Frame AT1IGCVol1.“
136	3234	2	DLC error of CAN-Receive-Frame AT1O1.
137	3234	9	„Timeout error of CAN-Receive-Frame AT1OG1. NOX sensor (SCR-system downstream cat; DPF-system downstream cat).“
138	3234	2	DLC error of CAN-Receive-Frame AT1O1Vol.
139	3234	9	Timeout error of CAN-Receive-Frame AT1OG1Vol.
140	523941	9	„Timeout error (BAM to packet) for CAN-Receive-Frame AT1OGCVol2.“
141	523942	9	„Calibration message 1 of the after catalyst Nox sensor has failed.“
142	523943	9	„Timeout error (PCK2PCK) for CAN-Receive-Frame AT1OGCVol2.“
153	523992	9	Not used.
155	0	0	Not used.
164	523211	9	Timeout error of CAN-Receive-Frame EBC1.
167	523704	12	Timeout error of CAN-Transmit-Frame EEC3.
168	523935	12	„Timeout error of CAN-Transmit-Frame EEC3VOL1. Engine send messages.“
169	523936	12	„Timeout error of CAN-Transmit-Frame EEC3VOL2. Engine send messages.“
171	523212	9	„Timeout error of CAN-Receive-Frame ComEngPrt. Engine Protection.“
172	523741	14	Engine shut off request through CAN.
174	523213	12	Timeout error of CAN-Transmit-Frame ERC1.
178	523706	12	Timeout error of CAN-Transmit-Frame FlEco.
179	523240	9	„Timeout CAN-message FunModCtl. Function Mode Control.“
193	523937	9	Timeout DFC for NOxSensGlbReqTx.
196	3227	2	DFC SAE J1939 error.
198	523216	9	„Timeout error of CAN-Receive-Frame PrHtEnCmd. Pre-heat command, engine command.“
202	523793	9	„Timeout error of CAN-Receive-Frame UAA10. AGS sensor service message.“
203	523794	9	„Timeout error of CAN-Receive-Frame UAA11. AGS sensor data.“
212	523803	9	„Timeout error of CAN-Receive-Message RxEngPres. Status Burner Air Pump.“
273	3219	2	DFC SAE J1939 error.
281	523766	9	Timeout error of CAN-Receive-Frame Active TSC1AE.
282	523767	9	Timeout error of CAN-Receive-Frame Passive TSC1AE.
283	523768	9	Timeout error of CAN-Receive-Frame Active TSC1AR.
284	523769	9	Timeout error of CAN-Receive-Frame Passive TSC1AR.
291	523776	9	Timeout error of CAN-Receive-Frame TSC1TE - active.
292	523777	9	„Passive timeout error of CAN-Receive-Frame TSC1TE. Setpoint.“

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Error codes	SPN	FMI	Error description
293	523778	9	Timeout error of CAN-Receive-Frame TSC1TR.
294	523779	9	Passive timeout error of CAN-Receive-Frame TSC1TR.
299	523788	12	„Timeout error of CAN-Transmit-Frame TrbCH. Status Wastegate.“
300	523605	9	„Timeout error of CAN-Receive-Frame TSC1AE. Traction Control.“
301	523606	9	„Timeout error of CAN-Receive-Frame TSC1AR. Retarder.“
305	898	9	„Timeout error of CAN-Receive-Frame TSC1TE. Setpoint.“
306	520	9	„Timeout Error of CAN-Receive-Frame TSC1TR; control signal“
313	523858	12	Timeout error of CAN-Transmit-Frame UAA11.
322	523867	12	„Timeout error of CAN-Transmit-Frame UAA1 on CAN 2. Control burner air pump.“
360	523982	0	„Powerstage diagnosis disabled. High battery voltage.“
361	523982	1	„Powerstage diagnosis disabled. Low battery voltage.“
362	523090	2	„Engine brake Pre-Selection switch. Plausibility error.“
376	630	12	Access error EEPROM memory (delete).
377	630	12	Access error EEPROM memory (read).
378	630	12	Access error EEPROM memory (write).
381	411	4	Physical range check low for EGR differential pressure.
384	2791	12	„Actuator EGR valve. Powerstage over temperature.“
387	523612	12	„Internal software error ECU. Injection cut off.“
388	190	0	„Engine speed above warning threshold. Overspeed detection in component engine protection.“
389	190	0	Engine speed above warning threshold (FOC-Level 1).
390	190	11	Engine speed above warning threshold (FOC-Level 2).
391	190	14	Engine speed above warning threshold (Overrun Mode).
411	108	11	„Ambient air pressure received from a CAN-bus is reported as defective.“
412	108	3	Sensor error ambient air pressure. Signal range check high.
413	108	4	Sensor error ambient air pressure. Signal range check low.
415	171	0	„Environment temperature sensor, temperature above upper physical threshold.“
416	171	1	Environment temperature physical range check low.
417	171	3	„Sensor error SCR-System environment temperature. DPF-System air inlet temperature, signal range check high.“
418	171	4	„Sensor error SCR-System environment temperature. DPF-System air inlet temperature, signal range check low.“
419	190	8	Sensor camshaft speed, disturbed signal.
420	190	12	„Sensor camshaft detection. Out of range, signal disrupted, no signal.“
421	190	2	„Offset angle between crank- and camshaft-sensor is too large.“
422	190	8	„Sensor crankshaft detection. Out of range, signal disrupted or no signal.“
423	190	12	Speed detection, out of range, signal disrupted or no signal.

Error codes	SPN	FMI	Error description
455	975	5	PWM-Signal fan, open load or short-circuit ground.
457	975	3	PWM-Signal fan, short-circuit to battery.
458	975	4	PWM-Signal fan, open load or short circuit to ground
459	1639	12	„Fan speed sensor, electrical error, signal disturbed or very low fan speed.“
460	1639	0	„Sensor error fan speed. Signal range check high or engine speed resp. fan speed too big.“
461	1639	1	„Sensor error fan speed, signal range check low or fan speed too low.“
462	523602	0	High fan speed, warning threshold exceeded.
463	523602	0	High fan speed, shut off threshold exceeded.
464	97	3	Sensor error water in fuel, signal range check high.
465	97	4	Sensor error water in fuel, signal range check low.
472	94	3	Sensor error low fuel pressure, signal range check high.
473	94	4	Sensor error low fuel pressure, signal range check low.
474	94	1	Low fuel pressure, warning threshold exceeded.
475	94	1	Low fuel pressure, shut off threshold exceeded.
483	174	11	Fuel temperature not plausible.
486	523618	3	„Sensor error gearbox oil temperature, signal range check high.“
487	523618	4	„Sensor error gearbox oil temperature, signal range check low.“
488	523619	2	„Physical range check high for exhaust gas temperature upstrem (SCR-CAT).“
489	523619	2	„Shutoff condition No detail informationen!“
500	523915	0	„HCI dosing valve (DV1); overcurrent at the end of the injection phase“
501	523915	12	HCI dosing valve (DV1): Powerstage overtemperature.
502	523915	3	HCI dosing valve (DV1): Short circuit to battery.
503	523915	3	Short circuit to battery high side, HCI dosing valve (DV1).
504	523915	4	HCI dosing valve (DV1): Short circuit to ground.
505	523915	11	HCI dosing valve (DV1): Short circuit high side powerstage.
506	523916	2	„Sensor HCI dosing valve (DV1) downstream pressure: Plausibility error.“
508	523916	0	„HCI dosing valve (DV1) downstream pressure: Physical range check high. Shut off regeneration.“
511	523916	1	„HCI dosing valve (DV1) downstream pressure: Physical range check low. Shut off regeneration.“
514	523916	3	„Sensor error HCI dosing valve (DV1) downstream pressure: Signal range check high.“
515	523916	4	„Sensor error HCI dosing valve (DV1) downstream pressure: Signal range check low.“
525	523917	4	„Sensor error DV1 & DV2 upstream pressure: Signal range check low.“
534	523918	3	„Sensor error DV1 & DV2 upstream temperature: Signal range check high.“
535	523918	4	„Sensor error DV1 & DV2 upstream temperature: Signal range check low.“
542	1638	2	Hydraulic oil temperature check for Shut off condition.
543	676	11	Cold start aid relay error.

Error codes	SPN	FMI	Error description
544	676	11	Cold start aid relay: Open load.
545	729	5	Cold start aid relay open load.
547	729	12	Cold start aid relay: Over temperature error.
549	729	3	Intake Air Heater Device: Short circuit to battery.
551	729	4	
559	523895	13	„Check of missing injector adjustment value programming (IMA) injector 1.“
560	523896	13	„Check of missing injector adjustment value programming (IMA) injector 2.“
561	523897	13	„Check of missing injector adjustment value programming (IMA) injector 3.“
562	523898	13	„Check of missing injector adjustment value programming (IMA) injector 4.“
563	523899	13	„Check of missing injector adjustment value programming (IMA) injector 5.“
564	523900	13	„Check of missing injector adjustment value programming (IMA) injector 6.“
565	523350	4	Injector cylinder-bank 1: Short circuit.
566	523352	4	Injector cylinder-bank 2: Short circuit.
567	523354	12	Injector powerstage output defect.
568	651	5	Injector 1 (in firing order): Interruption of electric connection.
569	652	5	Injector 2 (in firing order): Interruption of electric connection.
570	653	5	Injector 3 (in firing order): Interruption of electric connection.
571	654	5	Injector 4 (in firing order): Interruption of electric connection.
572	655	5	Injector 5 (in firing order): Interruption of electric connection.
573	656	5	Injector 6 (in firing order): Interruption of electric connection.
575	523756	14	„special pattern for special cases No detail informationen!“
576	523757	14	„special pattern for special cases No detail informationen!“
577	523758	14	„special pattern for special cases No detail informationen!“
578	523759	14	„special pattern for special cases No detail informationen!“
579	523760	14	„special pattern for special cases No detail informationen!“
580	651	3	Injector 1 (in firing order): Short circuit.
581	652	3	Injector 2 (in firing order): Short circuit.
582	653	3	Injector 3 (in firing order): Short circuit.
583	654	3	Injector 4 (in firing order): Short circuit.
584	655	3	Injector 5 (in firing order): Short circuit.
585	656	3	Injector 6 (in firing order): Short circuit.
590	655	4	„High side to low side short circuit in the injector 5 (in firing order)“
591	656	4	„High side to low side short circuit in the injector 6 (in firing order)“

Error codes	SPN	FMI	Error description
592	523615	5	Metering unit (Fuel-System): Open load.
593	523615	12	Metering unit (Fuel-System): Powerstage over temperature.
594	523615	3	Metering unit (Fuel-System): Short circuit to battery, highside.
595	523615	4	„Metering unit (Fuel-System): Short circuit to ground, high side.“
596	523615	3	Metering unit (Fuel-System): Short circuit to battery, low side.
597	523615	4	Metering Unit (Fuel-System): Short circuit to ground, low side.
598	523615	3	Metering unit, short circuit to battery
599	523615	4	Metering unit, short circuit to ground
605	1323	12	Too many recognized misfires in cylinder 2 (in firing order)
607	1323	12	Too many recognized misfires in cylinder 4 (in firing order)
608	1323	12	Too many recognized misfires in cylinder 5 (in firing order)
609	1323	12	Too many recognized misfires in cylinder 6 (in firing order)
610	1322	12	
611	1346	0	„Misfire detection monitoring No detail informationen!“
612	523612	12	Internal ECU monitoring detection reported error
613	523612	12	„ECU reported internal software error Internal ECU monitoring detection reported error“
614	523612	12	ECU reported internal software error
615	523612	12	ECU reported internal software error.
616	523612	12	ECU reported internal software error
617	523612	12	ECU reported internal software error
618	523612	12	ECU reported internal software error
619	523612	12	Injection system,electrical error injectors
620	523612	12	ECU reported internal software error
621	523612	12	ECU reported internal software error
623	523612	12	ECU reported internal software error
624	523612	12	ECU reported internal software error
625	523612	12	ECU reported internal software error
627	523612	12	ECU reported internal software error
628	523612	12	ECU reported internal software error
629	523612	12	„Diagnostic fault check to report the accelerator pedal position error“
630	523612	12	Diagnostic fault check to report the engine speed error
631	523612	12	Error in the plausibility of the injection energizing time
632	523612	12	Error in the plausibility of the start of energising angles
633	523612	12	„Diagnostic fault check to report the error due to non plausibility in ZFC“
634	523612	12	„Diagnosis fault check to report the demand for normal mode due to an error in the PoI2 quantity“

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Error codes	SPN	FMI	Error description
635	523612	12	„Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI2 shut-off“
636	523612	12	„Diagnosis fault check to report the error to demand for an ICO due to an error in the PoI3 efficiency factor“
637	523612	12	Internal ECU monitoring detection reported error
638	523612	12	Monitoring of Fuel Quantity Correction
639	523612	12	„Diagnostic fault check to report the plausibility error in rail pressure monitoring“
640	523612	12	„Diagnostic fault check to report the error due to torque comparison“
641	523612	12	„Diagnosis of curr path limitation forced by ECU monitoring level 2“
642	523612	12	„Diagnosis of lead path limitation forced by ECU monitoring level 2“
643	523612	12	„Diagnosis of set path limitation forced by ECU monitoring level 2.“
644	523612	3	Reported Over Voltage of Supply
646	523612	4	Reported UnderVoltage of Supply
648	523008	1	Manipulation control was triggered
649	523008	2	Timeout error in Manipulation control
654	2634	12	„Early opening defect of main relay No detail informationen!“
656	2634	12	„DFC for stuck main relay error No detail informationen!“
659	3226	2	„Nox feed back fault detection No detail informationen!“
692	523752	0	„Plausibiliti error during Rich to Lean switch over No detail informationen!“
693	523752	0	„Monitoring of Nox signal readyness No detail informationen!“
714	523612	12	„Diagnostic fault check to report WDA active due to errors in query-/response communi-cation“
715	523612	12	„Diagnostic fault check to report ABE active due to undervoltage detection“
716	523612	12	„Diagnostic fault check to report ABE active due to overvoltage detection“
717	523612	12	„Diagnostic fault check to report WDA/ABE active due to unknown reason“
720	98	2	„Plausibility Check No detail informationen!“
732	100	3	Sensor error oil pressure; signal range check high
733	100	4	Sensor error oil pressure sensor; signal range check low
734	100	0	High oil pressure; warning threshold exceeded.
735	100	0	High oil pressure; shut off threshold exceeded
736	100	1	Low oil pressure; warning threshold exceeded
737	100	1	Low oil pressure; shut off threshold exceeded
743	175	3	Sensor error oil temperature; signal range check high
744	175	4	Sensor error oil temperature; signal range check low
745	175	0	High oil temperature; warning threshold exceeded

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Error codes	SPN	FMI	Error description
746	175	0	High oil temperature; shut off threshold exceeded
747	1237	2	Override switch; plausibility error.
750	107	3	„Sensor error airfilter differential pressure; short circuit to battery“
751	107	0	„Sensor error airfilter differential pressure; short circuit to ground“
752	107	0	Air filter differential pressure; air filter cologged.
753	523919	2	DPF burner air pump pressure sensor, plausibility error
755	523919	0	„DPF burner air pump pressure sensor, pressure above upper shutoff threshold“
758	523919	1	„DPF burner air pump pressure sensor, pressure below lower shutoff threshold“
761	523919	3	„DPF burner air pump pressure sensor, short circuit to battery or open load“
762	523919	4	DPF burner air pump pressure sensor, short circuit to ground
763	523920	2	Exhaustgaspressure upstream burner, plausibility error
765	523920	0	„Exhaustgaspressure upstream burner, pressure above upper shutoff threshold“
770	523920	3	„Exhaustgaspressure upstream burner, short circuit to battery or open load“
771	523920	4	Exhaustgaspressure upstream burner, short circuit to ground
772	102	2	Pressure downstream charge air cooler, plausibility error
774	102	1	„Pressure downstream charge air cooler, pressure below lower physical threshold“
776	102	3	„Pressure downstream charge air cooler, short circuit to battery or open load“
777	102	4	„Pressure downstream charge air cooler, short circuit to ground“
780	523699	3	„Boost pressure control; negative governor deviation below limit“
781	523699	4	„learning valu too high No detail informationen!“
785	523889	3	„over teperature of device driver of pressure control valve No detail informationen!“
791	411	0	„signal range check low error of pressure control valve AD-channel delta pressure across venturi in EGR line above physical high limit“
793	411	0	„Plausibility Check fault for deviation of desired and actual EGR-mass flow, where the latter is calculated out of EGR Delta Pressure Sensor“
795	411	3	„Sensor error differential pressure Venturiunit (EGR), signal range check low.“
796	411	4	„Sensor error differential pressure Venturiunit (EGR), signal range check high.“
805	524025	14	„Particulate filter regeneration. Regeneration after time X is not successful (The error occurs when the regeneration times (3x) over the max. has been aborted allowed recovery time).“
806	524058	2	Particulate filter; regeneration not succesful
807	3253	2	Differential pressure DPF, plausibility error
809	3251	0	Differential pressure DPF maximum value is exceeded
810	3251	0	„Differential pressure sensor across DPF exceeds warning high limit“
812	3251	1	„Differential pressure DPF, pressure below lower shutoff threshold.“
813	3251	1	„Differential pressure DPF, pressure below lower warning threshold.“
814	3253	3	„Electrical error differential pressure B58 (DPF). (signal range check high)“

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Error codes	SPN	FMI	Error description
815	3253	4	„Electrical error differential pressure (DPF). signal range check low.“
825	523009	9	„The pressure relief valve (PRV) has reached the number of allowed activations.“
826	523470	2	„Pressure relief valve is forced to open, perform pressure increase.“
827	523470	2	„Pressure Relief Valve (PRV) forced to open. Performed by pressure increase.“
828	523470	12	„Pressure Relief Valve (PRV) forced to open. Shutoff conditions.“
829	523470	12	„Pressure Relief Valve (PRV) forced to open. Warning conditions.“
830	523470	14	Open Pressure Relief Valve (PRV)
831	523470	11	„Pressure Relief Valve (PRV) error; Rail pressure out of tolerance range.“
832	523470	11	„Rail pressure out of tolerance range. The PRV can not be opened at this operating point with a pressure shock.“
833	523009	10	„Open time of Pressure Relief Valve (PRV) for wear out monitoring had exceeded“
834	523906	5	Electrical fuel pre - supply pump; open load
835	523906	12	„Electrical fuel pre - supply pump. ECU powerstage over temperature.“
836	523906	3	Electrical fuel pre - supply pump; short circuit to battery
837	523906	4	„Electrical fuel pre - supply pump. Short circuit to ground.“
847	1176	0	„Pressure sensor upstream turbine, Physical Range Check high.“
848	1176	1	„Pressure sensor upstream turbine, Physical Range Check low.“
849	1176	3	„Pressure sensor upstream turbine, signal range check (SRC) high.“
850	1176	4	„Pressure sensor upstream turbine, signal range check (SRC) low.“
856	523613	0	Rail pressure metering unit, Positive governor deviation.
857	523613	0	„Rail pressure metering unit, Rail pressure disrupted. Maximum positive deviation of rail pressure exceeded.“
858	523613	0	„Rail pressure metering unit, Rail pressure disrupted. Maximum positive deviation of rail pressure in metering unit exceeded (RailMeUn1).“
859	523613	0	„Rail pressure metering unit, Rail pressure below the target range .(RailMeUn2) Railsystem leakage detected.(RailMeUn10)“
861	523613	1	„Rail pressure metering unit, Minimum rail pressure exceeded (RailMeUn3) Negative deviation of rail pressure second stage (RailMeUn22)“
862	523613	0	„Rail pressure metering unit, Maximum rail pressure exceeded.“
864	523613	2	„Rail pressure metering unit, Setpoint of metering unit in overrun mode not plausible.“
865	523613	0	Setpoint of metering unit in overrun mode not plausible
874	157	0	„Rail pressure raw value is intermittent No detail informationen!“
875	157	1	„rail pressure raw value is above maximum offset No detail informationen!“
876	523470	7	Maximum rail pressure exceeded (PRV).
877	157	3	„Sensor error rail pressure. Sensor voltage above upper limit.“
878	157	4	„Sensor error rail pressure. Sensor voltage below lower limit.“

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Error codes	SPN	FMI	Error description
881	523633	11	Longterm adaption factor below threshold
882	523633	11	„Nox conversion rate insufficient (SCR-Cat defect, bad DEF quality)“
883	523633	11	„Nox conversion rate insufficient (SCR-Cat defect, bad DEF quality); temperature range 1“
887	3234	11	„DFC for plausibility error Min for NOx sensor downstream of SCR Cat.“
889	3224	1	„DFC for plausibility error Max for NOx sensor upstream of SCR Cat“
892	4345	11	Sensor backflow line pressure (SCR); plausibility error
893	4343	11	„SCR Monitoring; Pressure stabilisation error, general pressure check error (SCR)“
894	4374	13	Pressure stabilisation error dosing valve (SCR)
897	523632	16	Pump pressure SCR metering unit too high.
898	523632	18	Pump pressure SCR metering unit too low
899	523632	0	Pressure overload of SCR-System.
900	523632	1	Pressure build-up error SCR-System.
903	4365	0	DEF tank temperature too high.
905	3241	0	„Sensor SCR catalyst upstream temperature too high; plausibility error.“
908	3361	7	DEF dosing valve blocked (SCR)
914	523720	2	„DEF supply module heater temperature; plausibility error (normal condition).“
915	523720	2	„Sensor DEF supply module heater temperature; plausibility error (cold start condition)“
916	523721	2	„Sensor DEF supply module temperature; plausibility error (normal condition)“
917	523721	2	„Sensor DEF supply module temperature; plausibility error (cold start condition)“
918	523981	11	„SCR plausibility, OBD and diagnosis; Stuck in range check of DEF tank temperature sensor DEF-tank without heating function (heating phase)“
919	523330	14	Immobilizer status; fuel blocked
920	523330	14	„DFC to block the fuel by Sia No detail informationen!“
921	523330	14	„DFC to indicate that TEN-code or UC-code received if ECU is learned. No detail informationen!“
922	523330	14	„DFC to indicate that no code is received via CAN. No detail informationen!“
923	523330	14	„DFC to indicate that wrong code is received. No detail informationen!“
925	523720	8	„DEF supply module heater temperature; duty cycle in failure range.“
926	523720	8	„DEF supply module heater temperature; duty cycle in invalid range.“
927	523721	11	Urea supply module temperature measurement not available.
928	523722	8	DEF supply module PWM signal; period outside valid range.
929	523722	8	Detect faulty PWM signal from Supply Modul.
930	523721	8	DEF supply module temperature; duty cycle in failure range.
931	523721	8	Urea supply module temperature; duty cycle in invalid range.
932	29	3	Handthrottle idle validation switch; short circuit to battery
935	91	3	„Sensor error accelerator pedal. Signal range check high.“

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Error codes	SPN	FMI	Error description
937	29	4	Handthrottle; short circuit to ground
940	91	4	„Sensor error accelerator pedal. Signal is below the range.“
942	523921	3	Sensor error burner temperature; signal range check high
943	3532	3	ensor error DEF tank level; signal range check high
944	523921	4	Sensor error burner temperature; signal range check low
945	3532	4	Sensor error DEF tank level; signal range check low
946	1079	13	Failure of sensor supply voltage 1.
947	1080	13	Failure of sensor supply voltage 2.
948	523601	13	Failure of sensor supply voltage 3.
956	677	3	„Starter relay high side. Short circuit to battery.“
957	677	4	Starter relay high side short circuit to ground.
958	677	5	Starter relay low side no load error.
959	677	12	Starter relay powerstage over temperature.
960	677	3	Starter relay low side short circuit to battery.
961	677	4	Starter relay low side short circuit to ground.
965	523922	3	Burner shut of valve; short circuit to battery
969	624	5	SVS lamp; open load
970	624	12	SVS lamp: powerstage over temperature
971	624	3	SVS lamp; short circuit to battery
972	624	4	SVS lamp; short circuit to ground
973	523612	14	Softwarereset CPU SWReset_0
974	523612	14	Softwarereset CPU SWReset_1
975	523612	14	Softwarereset CPU SWReset_2
976	91	11	„Plausibility error between APP1 and APP2 or APP1 and idle switch.“
978	29	2	„Plausibility error between sensor and idle switch, Acceleration Pedal Detection. In case of Hand Throttle with Low Idle Switch, it is the plausibility check between hand throttle and idle switch.“
980	523550	12	Terminal 50 was operated too long
981	172	3	„Air flow temperature sensor; short circuit to battery or open load.“
982	172	4	„Sensor Luftmengentemperatur; Massekurzschluss Air flow temperature sensor; short circuit to ground“
986	523921	0	„Burner temperature, temperature above upper shutoff threshold“
989	523921	1	„Burner temperature, temperature below lower shutoff threshold“
992	105	1	„Charged Air cooler down stream temperature. Temperature below lower physical threshold.“
994	105	3	„Electrical error charged air temperature. Signal range check high.(SRC)“
995	105	4	„Electrical error charged air temperature. Signal range check low.“

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Error codes	SPN	FMI	Error description
996	105	0	„Charged air cooler temperature. System reaction initiated. High charged air cooler temperature. Warning threshold exceeded.“
997	105	0	„High charged air cooler temperature. Shut off threshold exceeded.“
998	105	11	„Diagnostic fault check for charged air cooler downstream temperature sensor No detail informationen!“
1007	412	3	„Electrical error EGR cooler downstream temperature. Signal range check high.“
1008	412	4	„electrical error EGR cooler downstream temperature. Signal range check low.“
1011	523960	0	„Physical range check high for EGR cooler downstream temperature.“
1012	523960	1	„Physical range check low for EGR cooler downstream temperature.“
1014	51	6	„Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8). Signal range check high.“
1015	520521	5	„Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); signal range check low.“
1016	51	7	„Actuator position for EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8) not plausible.“
1022	51	6	„Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); signal range check high“
1023	51	5	„Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); signal range check low“
1024	51	3	„Position sensor error of actuator EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8). Signal range check high.“
1025	51	4	„Position sensor error actuator EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8). Signal range check low.“
1026	4769	2	Temperature downstream DOC, plausibility error
1029	4766	0	„Temperature downstream DOC, temperature above upper shutoff threshold“
1030	4766	0	„Temperature downstream DOC, temperature above upper warning threshold“
1034	4769	3	„Sensor error exhaust gas temperature downstream (DOC); signal range check high“
1035	4769	4	„Sensor error exhaust gas temperature downstream (DOC); signal range check low“
1036	4768	2	Temperature upstream DOC, plausibility error
1039	4765	0	„Temperature upstream DOC, temperature above upper shutoff threshold“
1040	4765	0	„Temperature upstream DOC, temperature above upper warning threshold“
1044	4768	3	„Electrical error exhaust gas temperature upstream (DOC); signal range check high“
1045	4768	4	„Electrical error exhaust gas temperature upstream (DOC); signal range check low“
1047	3248	4	„Sensor error particle filter downstream temperature; signal range check low“
1067	1180	3	„Sensor error exhaust gas temperature upstream turbine; signal range check high“
1069	4360	0	„Exhaust temperature upstream SCR-Cat, temperature above upper physical threshold“
1070	4360	1	„Sensed exhaust temperature before SCR-Cat is < physical low limit“
1071	4361	2	„Signal error for CAN message Detailinformationen fehlen! Signal error for CAN message No detail informationen!“
1072	4361	3	„Sensor error DEF catalyst exhaust gas temperature upstream; signal range check high“
1073	4361	4	„Sensor error DEF catalyst exhaust gas temperature upstream; signal range check low“

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Error codes	SPN	FMI	Error description
1074	1761	14	DEF tank level; warning threshold exceeded
1075	3361	6	DEF dosing valve; power at the end of injection too high
1077	3361	3	DEF dosing valve; short circuit to battery on low side
1078	3361	3	„DEF dosing valve; short circuit to battery or open load on high side“
1079	3361	4	„Urea dosing valve; short circuit to ground or open load on low side“
1080	3361	4	DEF dosing valve; short circuit on high side
1081	4345	5	SCR heater relay DEF returnline sekondary side; open load
1082	4366	5	SCR main relay (secondary side): open load
1083	4343	5	„SCR heater relay DEF pressureline secondary side; open load“
1084	4366	5	SCR main relay (secondary side); Shortcut to battery
1085	4366	5	„SCR main relay (secondary side), heat relay (secondary side), heating elements or heating valve short to ground.“
1086	4341	5	SCR heater relay DEF supplyline secondary side; open load
1087	523719	5	„SCR heater relay DEF supply modul secondary side; open load“
1088	4366	5	SCR Tank heating valve secundary side: open load
1089	4243	11	„SCR system heater diagnostic reports error; shut off SCR-system“
1090	4345	5	SCR heater relay DEF returnline primary side; open load
1092	4345	3	SCR heater DEF returnline; short circuit to battery
1093	4345	4	SCR heater DEF returnline; short circuit to ground
1094	4343	5	SCR heater relay DEF pressureline primary side; open load
1096	4343	3	SCR heater DEF pressureline; short circuit to battery
1097	4343	4	SCR heater DEF pressureline; short circuit to ground
1098	523718	5	tank heating valve; open load
1099	523718	12	SCR main relay (primary side); powerstage over temperature
1100	523718	3	SCR main relay (primary side); short circuit to battery
1101	523718	4	SCR main relay (primary side); short circuit to ground
1102	4341	5	SCR heater relay DEF supply line primary side; open load
1104	4341	3	SCR-heater DEF supplyline; short circuit to battery
1105	4341	4	SCR-heater DEF supply line; short circuit to ground
1106	523719	5	SCR heater relay DEF supplymodule primary side; open load
1108	523719	3	SCR heater DEF supplymodule; short circuit to battery
1109	523719	4	SCR heater DEF supplymodule; short circuit to ground
1110	4366	5	SCR tank heating valve primary side; open load
1112	4366	3	SCR Tank heating valve; short circuit to battery
1113	4366	4	SCR Tank heating valve; short circuit to ground
1117	523632	11	Pump motor not available for actuation
1118	4375	5	Urea pump motor; open load

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3.7 Troubleshooting

Error codes	SPN	FMI	Error description
1120	4375	3	Urea pump motor; short circuit to battery
1121	4375	4	Urea pump motor; short circuit to ground
1122	4334	0	„Supply module DEF, DEF pressure above upper physical threshold“
1123	4334	1	„Urea supply module pressure sensor; physical range check low (defect pressure sensor)“
1124	4334	0	Urea pump pressure sensor; high signal not plausible
1125	4334	1	Urea pump pressure sensor; low signal not plausible
1126	523632	2	„Signal error for CAN message No detail informationen!“
1127	523632	3	Sensor error urea pump pressure; signal range check high
1128	523632	4	Sensor error urea pump pressure; signal range check low
1129	4376	5	SCR reversal valve; open load
1130	4376	12	SCR reversing valve; over temperature
1131	4376	3	SCR reversal valve; short circuit to battery
1132	4376	4	SCR reversing valve; short circuit to ground
1135	3031	0	DEF tank, DEF temperature in DEF tank is to high.
1136	3031	1	DEF tank, DEF temperature below lower physical threshold
1137	4365	2	Tank temperature signal error for CAN message
1138	4365	3	Sensor error urea tank temperature: short circuit to battery
1139	4365	4	Sensor error urea tank temperature; short circuit to ground.
1157	97	12	Water in fuel level prefilter; maximum value exceeded
1158	523946	0	„Zerofuel calibration injector 1 (in firing order); maximum value exceeded“
1159	523947	0	„Zerofuel calibration injector 2 (in firing order); maximum value exceeded“
1160	523948	0	„Zerofuel calibration injector 3 (in firing order); maximum value exceeded“
1163	523951	0	„Zerofuel calibration injector 6 (in firing order); maximum value exceeded“
1164	523946	1	„Zerofuel calibration injector 1 (in firing order); minimum value exceeded“
1165	523947	1	„Zerofuel calibration injector 2 (in firing order); minimum value exceeded“
1166	523948	1	„Zerofuel calibration injector 3 (in firing order); minimum value exceeded“
1167	523949	1	„Zerofuel calibration injector 4 (in firing order); minimum value exceeded“
1168	523950	1	„Zerofuel calibration injector 5 (in firing order); minimum value exceeded“
1170	523612	12	Internal software error ECU
1180	168	0	Physical range check high for battery voltage
1181	168	1	Physical range check low for battery voltage
1183	172	1	Air inlet filter sensor out of physical range check
1187	523980	14	Bad quality of reduction agent detected
1193	1180	0	„Physical range check high for exhaust gas temperature upstream turbine“
1194	1180	1	„Physical range check low for exhaust gas temperature upstream turbine“

Error codes	SPN	FMI	Error description
1219	524018	14	„HMI engine derate service state DPF wasn´t regenerated, power reduction phase 1 (manuell regeneration request)“
1220	524022	14	„HMI engine derate stop state DPF wasn´t regenerated, power reduction phase 2 (manuell regeneration request)“
1222	190	14	„Camshaft- and Crankshaft speed sensor signal not available on CAN“
1223	51	5	„Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); open load“
1224	51	6	„Actuator EGR-Valve (2.9;3.6) or Throttle-Valve (6.1,7.8); over current“
1226	51	3	„EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); short circuit to battery“
1227	51	3	„EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); short circuit to battery“
1228	51	4	„EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); short circuit to ground“
1229	51	4	„EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); short circuit to ground“
1230	51	6	„Actuator error EGR-Valve (2.9;3.6) or Throttle-Valve (4.1;6.1;7.8); Overload by short-circuit“
1231	51	11	Power stage overtemperature due to high current.
1232	51	4	„actuator AGR valve (2.9;3.6) throttle valve (4.1;6.1;7.8); Voltage below threshold.“
1239	523984	3	UB7; Short circuit to battery error of actuator relay 7
1241	523986	4	UB6; Short circuit to ground actuator relais 6
1242	523987	4	UB7; Short circuit to ground actuator relay 7
1247	524019	11	„Burner Control; Air Line - Blocked Air Pump; air lines blocked“
1248	523910	9	„Burner Control; Air Pump - CAN Lost Air Pump; CAN communication lost“
1249	523910	7	„Air pump;CAN communication interrupted no purge function available“
1250	523910	12	Air Pump; internal error
1252	523910	0	Air Pump; operating voltage error
1254	524014	1	„Air inlet EPV - pressure too low Air pressure glow plug flush line; below limit“
1255	524013	7	„Burner Control; Flame lost max Burner operation is interrupted too often“
1257	523915	7	HCI dosing valve (DV1); blocked open
1258	524016	11	„Burner Control; HFM - Electrical Fault HFM sensor; electrical fault“
1259	524016	2	„Burner Control; HFM - Plausibilitätsfehler 1 Amount of air is not plausible to pump speed“
1261	523910	6	„Burner Control Air Pump; over current Air pump electrically overloaded“
1262	523922	7	„Burner Control; Shut-off Valve - Blocked closed Burner Shut Off Valve; blocked closed“
1263	524021	11	„Burner Control; Fuel line ShutOff downstream - broken Burner fuel line pipe leak behind Shut Off Valve“
1264	523922	7	Burner Shut Off Valve; blocked open
1285	524038	9	„Timeout error of CAN-Receive-Frame ComMS_Sys1TO (error memory Slave); Master-Slave internal CAN message“
1286	524039	9	„Timeout error of CAN-Receive-Frame ComMS_Sys2TO (error memory Slave); Master-Slave internal CAN message“
1287	524040	9	„Timeout error of CAN-Receive-Frame ComMS_Sys3TO (error memory Slave); Master-Slave internal CAN message“

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Error codes	SPN	FMI	Error description
1288	524041	9	„Timeout error of CAN-Receive-Frame ComMS_Sys4TO (error memory Slave); Master-Slave internal CAN message“
1289	524042	9	„Timeout error of CAN-Receive-Frame ComMS_Sys5TO (error memory Slave); Master-Slave internal CAN message“
1290	524043	9	„Timeout error of CAN-Receive-Frame ComMS_Sys6TO (error memory Slave); Master-Slave internal CAN message“
1291	524045	9	„Master Slave, Error of message counter CAN receive message ComMSMoFOvR; ComMS-MoFOvR1CNT“
1292	524046	9	„Master-Slave CAN; Error Checksum of CAN-Receive Message“
1293	524047	9	„Master-Slave CAN; Error of message length of CAN receive message ComMSMoFOvR;_ ComMSMoFOvR1DLC“
1294	524048	9	„Timeout error CAN message ComMSMoFOvR1TO error memory Slave“
1299	523788	0	Wastegate plauisibility error off CAN transmit message.
1300	523788	0	„Timeout Error of CAN-Receive-Frame ComTrbChActr; Wastegate“
1302	524024	11	„Deviation of the exhaust gas temperature setpoint to actual value downstream (DOC) too high“
1324	523995	13	„Check of missing injector adjustment value programming (IMA) injector 7 (in firing order)“
1325	523996	13	„check of missing injector adjustment value programming (IMA) injector 8 (in firing order)“
1326	523997	4	Injector cylinder bank 1 slave; short circuit
1327	523998	4	Injector cylinder bank 2 slave; short circuit
1328	523999	12	Injector powerstage output Slave defect
1329	524000	5	Injector 7 (in firing order); interruption of electric connection
1330	524001	5	Injector 8 (in firing order); interruption of electric connection
1333	524000	3	Injector 7 (in firing order); short circuit
1334	524001	3	Injector 8 (in firing order); short circuit
1337	2797	4	„Timeout of Short-Circuit Ground Diagnosis Cyl. Bank 0;_IVDiaShCirGndToutBnk_0“
1338	2798	4	„Timeout of Short-Circuit Ground Diagnosis Cyl. Bank 1;_IVDiaShCirGndToutBnk_1“
1339	2797	4	Injector diagnostic; Short circuit to ground cylinder bank 0
1340	2798	4	Injector diagnostic; Short circuit to ground cylinder bank 1
1341	524035	12	Injector diagnostics; time out error in the SPI communication
1342	524036	12	„Injector diagnostics Slave; time out error in the SPI communication“
1345	524069	9	„Timeout Error of CAN-Receive-Frame MSMon_FidFCCTO; Master-Slave CAN communication faulty“
1357	524052	11	Error memory Slave reports FID MSMonFC2 (collective error)
1368	524052	11	Error memory Slave reports FID MSMonFC3 (collective error)
1378	523919	2	Sensor air pump airpressure; plausibility error
1379	523920	2	Sensor exhaust gas back pressure burner; plausibility error
1380	3253	2	Sensor differential pressure (DPF); plausibility error
1381	164	2	Rail pressure safety function is not executed correctly ()
1389	523922	5	Burner Shut Off Valve; open load

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Error codes	SPN	FMI	Error description
1390	523922	12	Burner Shut Off Valve; powerstage over temperature
1392	523922	4	Burner Shut Off Valve; short circuit to ground
1395	523921	2	„Burner temperature sensor; Plausibility Check for burner temperature sensor Sensor burner temperature; plausibility error“
1398	1136	0	Physical range check high for ECU temperature
1402	4769	2	„Sensor exhaust gas temperature OxiCat downstream (normal operation); plausibility error“
1403	4769	2	„Sensor exhaust gas temperature OxiCat downstream (regeneration); plausibility error“
1411	1188	11	Wastegate actuator; internal error
1412	1188	11	Wastegate actuator; EOL calibration not performed correctly
1413	1188	13	„Wastegate actuator calibration deviation too large, recalibration required“
1414	1188	2	Wastegate; status message from ECU missing
1415	1188	7	Wastegate actuator; blocked
1417	1188	11	Wastegate actuator; over temperature (> 135°C)
1418	1188	11	Wastegate actuator; operating voltage error
1423	51	0	„Warning threshold for an internal actuator error exceeded, <4L EGR.actuator und >4L Air Intake Flap“
1424	51	1	„Shut off threshold for an internal actuator error exceeded, <4L EGR.actuator und >4L Air Intake Flap“
1425	172	0	„air temperature within air filter box above maximum physical value“
1431	524028	2	CAN message PROEGRActr; plausibility error
1432	524029	2	„Timeout Error of CAN-Receive-Frame ComEGRActr - exhaust gas recirculation positioner“
1436	524034	5	Disc Separator; open load
1437	524034	12	Disc Separator; powerstage over temperature
1438	524034	3	Disc separator; short circuit to battery
1439	524034	4	Disc separator; short circuit to ground
1440	524030	7	EGR actuator; internal error
1441	524031	13	EGR actuator, calibration error
1442	524032	2	EGR actuator; status message „EGRCust“ is missing
1443	524033	7	EGR actuator; due to overload in Save Mode
1455	3711	12	Temperature during stand-still main phase too low or too high
1458	523960	0	„High exhaust gas temperature EGR cooler downstream; warning threshold exceeded.“
1464	0	0	
1466	0	0	
1467	0	0	
1469	0	0	
1470	0	0	
1471	0	0	

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Error codes	SPN	FMI	Error description
1472	0	0	
1481	524025	5	DPF system; operating voltage error
1482	524044	9	CAN message ComMS_Sys7 not received from slave
1484	524068	2	„Master ECU and Slave ECU have been identified as the same types“
1485	524052	11	„Master ECU and Slave ECU data sets or software are not identical“
1486	523718	5	SCR mainrelay; open load (only CV56B)
1488	523718	3	SCR mainrelay; short circuit to battery (only CV56B)
1489	523718	4	SCR mainrelay; short circuit to ground (only CV56B)
1490	4376	5	SCR reverting valve; open load
1491	4376	12	SCR reverting valve; over temperature
1493	4376	4	SCR reverting valve; short circuit to ground
1505	524057	2	Fuel low pressure pump; error pressure build up
1523	2659	2	Exhaust Gas Recirculation AGS Sensor; signal not plausible
1524	2659	0	„Exhaust Gas Recirculation AGS Sensor; Sensed exhaust mass value above maximum physical value“
1525	2659	1	„Exhaust Gas Recirculation AGS Sensor; Sensed exhaust mass value below miniimum physical value“
1526	2659	12	„Exhaust Gas Recirculation AGS Sensor; plausibility error, AGS sensor has not passed the burn off process“
1527	2659	2	„Exhaust Gas Recirculation AGS Sensor; Temperature of EGR mass not plausible“
1529	524070	2	„(Upstream NOx-Sensor) Diagnostic Fault Check for invalid upstream NOx value (Sensor self diagnostic DFC set by Deutz-SW) NOx-Sensor before SCR-Cat: Invalid upstream NOx value“
1530	524071	2	„(Downstream NOx-Sensor) Diagnostic Fault Check for invalid downstream lambda value (Sensor self diagnostic DFC set by Deutz-SW)“
1531	524072	2	„(Upstream NOx-Sensor) Diagnostic Fault Check for invalid upstream lambda value (Sensor self diagnostic DFC set by Deutz-SW)“
1532	524073	2	„(Downstream NOx-Sensor) Diagnostic Fault Check for invalid downstream NOx value (Sensor self diagnostic DFC set by Deutz-SW)“
1533	524074	9	„NOx sensor downstream SCR-CAT, sensor internally open load“
1534	524075	11	„NOx sensor downstream SCR-CAT, sensor internally short circuit“
1535	524076	9	NOx sensor upstream SCR-CAT, sensor internally open line
1536	524077	11	„NOx sensor upstream SCR-CAT, sensor internally short circuit“
1537	524078	9	„NOx sensor downstream SCR-CAT, lambda value above upper physical threshold“
1538	524079	9	„NOx sensor downstream SCR-CAT, lambda value below lower physical threshold“
1539	524080	9	„NOx sensor upstream SCR-CAT, lambda value above upper physical threshold“
1540	524081	9	„NOx sensor upstream SCR-CAT, lambda value below lower physical threshold“
1541	524082	9	„(Downstream NOx-Sensor) Diagnostic Fault Check for downstream NOx value over maximum limit (DFC set by Deutz-SW)“
1542	524083	9	„NOx-Sensor downstream SCR-CAT, NOx value below minimum value.“

Error codes	SPN	FMI	Error description
1543	524084	9	„NOx-Sensor upstream SCR-CAT, NOx value above maximum value.“
1544	524085	9	„NOx sensor upstream SCR-CAT, NOx value below lower physical threshold“
1545	524149	2	„Plausibility error between pressure downstream turbine (PTrbnDs) and ambient air pressure (EnvP)“
1555	524063	5	„Relay Urea backflow line heater: broken wiring detected (open load) in-line engine: SCR-backflow line (K29) V-engine: Master: SCR-suction / backflow line (K32.1) Slave: SCR-suction / backflow line (K32.2)“
1556	524063	5	SCR main relay not connected
1557	524063	5	SCR heater pressureline; open load
1558	524063	3	SCR heater mainrelay; short circuit to battery
1559	524063	4	„SCR heater main relay load side (K31) on heating valve (Y31), Short cut to ground.“
1560	524063	5	„Relay Urea suction line: broken wiring detected (open load) Row engine: SCR suction line (K28) V-engine: Master: common SCR-suction line (K28) Slave: commoon SCR backflow line (K29)“
1561	524063	5	SCR heater supply module; open load
1562	524063	5	SCR heater tank; open load
1565	524065	0	„Pressure sensor upstream SCR-CAT, pressure above upper physical threshold“
1566	524065	1	„Pressure sensor upstream SCR-CAT, pressure below lower physical threshold“
1569	524065	3	„Pressure sensor upstream SCR-CAT; short circuit battery or open load“
1570	524065	4	Pressure sensor upstream SCR-CAT; short circuit ground
1579	524066	3	„SCR measurement heater output stage; short circuit battery or open load“
1581	524067	0	„DEF supply module, heater temperature above upper physical threshold“
1582	524067	1	„DEF supply module, heater temperature below lower physical threshold“
1585	524067	0	„DEF supply module, temperature above upper physical threshold“
1586	524067	1	„DEF supply module, temperature below lower physical threshold“
1593	1761	0	DEF tank, DEF level above upper physical threshold
1594	1761	1	DEF tank, DEF level below lower physical threshold
1597	524149	2	Pressure downstream turbine, plausibility error
1598	524065	2	Pressure sensor upstream SCR-CAT, plausibility error
1617	3699	2	„Passive regeneration of DPF; DOC error Temperature sensor us. and ds. DOC simultaneously defect“
1619	524087	5	Urea Error Lamp; open load
1620	524087	12	Urea Error Lamp; temperatur over limit
1621	524087	3	Urea Error Lamp; short circuit battery
1622	524087	4	Urea Error Lamp; short circuit ground
1630	524132	2	„Fuel low pressure upstream fuel low pressure pump not plausible“
1631	524132	0	„Fuel low pressure upstream fuel low pressure pump, pressure above maximum warning threshold“

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Error codes	SPN	FMI	Error description
1632	524132	0	„Fuel low pressure upstream fuel low pressure pump, pressure above maximum shut off threshold“
1633	524132	1	„Fuel low pressure upstream fuel low pressure pump, pressure below minimum shut off threshold“
1634	524132	1	„Fuel low pressure upstream fuel low pressure pump, pressure below minimum warning threshold“
1635	3699	0	„Maximum standstill time reached; oil exchange request ignored“
1639	524147	13	SCR System,pressure build up not possible
1646	524063	12	DEF supply modul, time for defrosting too long
1647	524063	12	DEF tank, time for defrosting too long
1654	1761	14	„Urea Tank Signal to HMI for indicating the Urea Tank-Level (Urea tank volume ratio low threshold 1)“
1655	1761	14	DEF tank, DEF level below first warning threshold
1656	1761	14	DEF tank, DEF level below second warning threshold
1658	524096	14	„Control of the SCR system; If the start stop counter (EPA-Counter) exceeds the threshold SCRCtl_ctEngStrtStopThresh_C. This counter will increment only once in each driving cycle in case of an SCR error. If the counter reaches the threshold, the DFC will be set to inhibit the engine start Engine will not be started, because of EPA-Counter“
1659	524114	9	Timeout error of CAN-Transmit-Frame A1DOC
1660	524115	9	Timeout error of CAN-Transmit-Frame AT1S
1661	524116	9	Timeout error of CAN-Transmit-Frame SCR2“
1662	524117	9	Timeout error of CAN-Transmit-Frame SCR3“
1663	524097	9	Timeout error of CAN-Transmit-Frame DPFBrnAirPmpCtl
1664	524098	9	Timeout error of CAN-Transmit-Frame ComDPFBrnPT
1665	524099	9	Timeout error of CAN-Transmit-Frame ComDPFC1
1666	524100	9	Timeout error of CAN-Transmit-Frame ComDPFHisDat.
1667	524101	9	Timeout error of CAN-Transmit-Frame ComDPFTstMon
1668	524105	9	„Timeout error of CAN-Transmit-Frame ComEGRMsFlw (EGR Steller)“
1669	524108	9	„Timeout error of CAN-Transmit-Frame ComEGRTVActr (EGR actuator)“
1670	524110	9	Timeout error of CAN-Transmit-Frame ComETVActrTO.
1671	524112	9	Timeout ComIntake Throttle Valve Actr.
1672	524118	9	Timeout error of CAN-Receive-Frame ComRxCM1
1675	524103	9	Timeout error of CAN-Receive-Frame ComRxDPFBrnAirPmp
1676	524104	9	Timeout error of CAN-Receive-Frame ComRxDPFCtl.
1677	524106	9	„Timeout error of CAN-Receive-Frame ComRxEGRMsFlw1 (EGR actuator)“
1678	524107	9	„Timeout error of CAN-Receive-Frame ComRxEGRMsFlw2 (EGR actuator)“
1679	524109	9	„Timeout error of CAN-Receive-Frame ComRxEGRTVActr (EGR actuator)“
1680	524111	9	Timeout error of CAN-Receive-Frame ComRxETVActr
1681	524113	9	Timeout error of CAN-Receive-Frame ComRxITVActr

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Error codes	SPN	FMI	Error description
1682	524120	9	Timeout error of CAN-Receive-Frame ComRxSCRHtDiag“
1683	524121	9	„Timeout error of CAN-Receive-Frame ComRxTrbChActr (wastegate actuator)“
1684	524122	9	„Timeout error of CAN-Receive-Frame ComRxUQSens (Urea quality)“
1685	524123	9	Timeout error of CAN-Receive-Frame ComSCRHtCtl“
1686	524124	9	Timeout error of CAN-Receive-Frame ComTxAT1IMG“
1687	524125	9	„Timeout error of CAN-Receive-Frame ComTxTrbChActr (Wastegate actuator)“
1698	524133	2	HMI system; set if restore button blocked
1699	524134	0	DPF, ash load exceeds the shutoff threshold
1700	524134	0	DPF, ash load exceeds the warning threshold
1701	524135	0	DPF, soot load exceeds the shutoff threshold
1702	524135	14	DPF, soot load exceeds the service request threshold
1703	524135	0	DPF, soot load exceeds the warning threshold
1705	524156	9	Timeout error of CAN-Receive-Frame ComRxEBC2.
1706	524157	9	Fancontrol; time out for fan governing
1708	524159	0	Fan; short circuit battery or open load
1709	524159	1	Fan; short circuit ground
1710	524160	5	Fan; in/outlet valve 1; open load
1712	524160	3	Fan; in/outlet valve 1; short circuit battery
1713	524160	4	Fan; in/outlet valve 1; open load ground
1714	524161	5	Fan; in/outlet valve 2; open load
1716	524161	3	Fan; in/outlet valve 2; short circuit battery
1717	524161	4	Fan; in/outlet valve 2; open load ground
1718	524162	12	Fan; fancontrol; angle sensor defect
1719	524163	12	Fan; fancontrol; fan or valve defect
1752	2791	7	EGR actuator, actuator blocked
1753	2791	2	EGR actuator, CAN error
1754	2791	13	EGR actuator, EOL calibration error
1755	2791	12	EGR Actuator, internal electrical fault
1756	2791	13	EGR actuator, learning process aborted
1757	2791	6	EGR actuator current is above maximum threshold
1758	2791	3	„EGR actuator supply voltage is above the maximum threshold“
1759	2791	4	EGR actuator supply voltage is below minimum threshold.
1760	2791	13	EGR actuator, learning process out of range
1761	2791	7	EGR actuator, broken spring detected.
1762	2791	16	EGR actuator, temperature high.
1763	2791	0	EGR actuator, temperature critical high
1788	1188	7	Turbocharger wastegate, mechanical blocking detected.

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Error codes	SPN	FMI	Error description
1789	1188	2	Turbocharger wastegate, CAN Error
1790	1188	13	Turbocharger wastegate, EOL calibration error.
1791	1188	12	Turbocharger wastegate, internal electrical error
1792	1188	13	Turbocharger wastegate, learning process aborted.
1793	1188	6	Turbocharger wastegate, current above maximum threshold.
1794	1188	3	„Turbocharger wastegate, supply voltage above maximum threshold.“
1795	1188	4	„Turbocharger wastegate, supply voltage below minimum threshold.“
1796	1188	13	Turbocharger wastegate, learning process out of range.
1797	1188	7	Turbocharger wastegate, broken spring detected.
1799	1188	0	Turbocharger wastegate, temperature critical high.
1827	524141	7	DEF dosing valve, dosing valve blocked
1857	523612	12	Engine starter, plausibility error of starter release condition
1858	524147	7	SCR-System, reverting valve blocked
1859	524175	0	SCR-CAT, Nox emissions above maximum threshold
1860	524074	2	„NOx-Sensor after SCR-Cat: Nox-Sensor dew point problem or plausibility problem“
1861	524076	2	„NOx-Sensor before SCR-Cat: Nox-Sensor dew point problem or plausibility problem“
1863	524177	7	SCR System, DEF suction line blocked
1864	524178	7	SCR System, DEF pressure out of range
1865	4360	2	Exhaust temperature sensor upstream SCR, plausibility error
1866	4334	2	DEF supply module pressure, plausibility error
1867	524067	2	Supply module heater temperature, plausibility error
1868	524067	2	Supply module temperature, plausibility error
1869	1761	2	DEF tank level, plausibility error
1870	3031	2	Urea tank temperature outside of plausible thresholds
1874	524152	2	Urea Quality Sensor; Timeout CAN message
1875	524153	2	„Urea tank level & urea tank temperature via CAN bus, timeout of CAN message“
1880	1761	14	DEF tank, DEF level below third warning threshold
1881	4768	2	„exhaust gas temperature sensors up- and downstream DOC are physically swapped“
1882	524025	14	„The standstill-regeneration mode time exceeds the long-limit. Vehicle was too long or too often in standstill mode. Make oil change and reset counter.“
1883	524025	14	„The standstill-regeneration mode time exceeds the short-limit. Vehicle was too long or too often within a short time in standstill mode. Make oil change and reset counter.“
1884	524184	9	
1889	524189	9	Master / Slave Can disturbed.
1891	524190	14	1 Inducement level 1 activ
1892	524191	14	2 Inducement level 2 activ

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Error codes	SPN	FMI	Error description
1893	524193	8	„The standstill-regeneration mode time exceeds the long limit threshold. Vehicle was too long or too often in standstill mode. Change oil and reset counter.“
1894	524194	8	„The standstill-regeneration mode time exceeds the short-limit. Vehicle was too long or too often within a short time in standstill mode. Change oil and reset counter.“
1895	3519	12	DEF tank temperature, temperature too high
1896	3520	3	DEF quality sensor, short circuit to battery or open load
1897	3520	4	DEF quality sensor, short circuit to ground
1898	3519	3	„DEF quality sensor, internal temperature sensor short circuit to battery or open load“
1899	3519	4	„DEF quality sensor, internal temperature sensor short circuit to ground“
1900	524195	14	Standstill request due to crystalisation ignored too long
1901	524196	13	Variant handling, address error
1902	524196	2	Variant handling, Synchronisation error
1904	3520	2	„DEF quality sensor, Significantly diluted DEF or another liquid than DEF in the tank.“
1905	3520	8	„DEF quality sensor, DEF quality cannot be measured within a certain time frame.“
1907	3520	13	Urea quality at UQS invalid
1908	3519	13	Temperature at UQS invalid
1909	4365	12	Urea Tank Temperature is above the warning threshold
1910	3532	13	„DEF qualitysensor, tank level; DEF level out of physial range“
1911	3532	3	The DEF Level at UQS out of max. physical range
1912	3532	4	Quality at UQS out of min. physical range
1913	4365	13	„DEF qualitysensor, tank temperatur; Temperature out of physial range“
1914	4365	3	„DEF qualitysensor, tank temperatur; Short circuit to battery or open load“
1915	4365	4	DEF qualitysensor, tank temperatur; Short circuit to ground
1917	3936	14	Standstill request ignored too long.
1918	3936	14	Standstill time based escalation requests Inducement step 2
1921	51	5	„Intake Throttle Flap, H-Bridge, wiring harness broken at connected actuator“
1922	51	6	„Intake Throttle Flap, H-Bridge, current above maximum threshold“
1924	51	3	Intake Throttle Flap, H-Bridge, short circuit to battery (A02)
1925	51	3	Intake Throttle Flap, H-Bridge, short circuit to battery (A67)
1926	51	4	Intake Throttle Flap, H-Bridge, short circuit to ground (A02)
1927	51	4	Intake Throttle Flap, H-Bridge, short circuit to ground (A67)
1931	51	7	„Intake Throttle Flap, H-Bridge, position of actuator not plausible (deviation from setpoint more than 7%)“
1935	51	3	„Intake Throttle Flap, H-Bridge, short circuit to battery oder broken wiring harness“
1936	51	4	Intake Throttle Flap, H-Bridge, short circuit to ground
1943	524202	11	SCR error code in master ECU active.
1944	524203	11	DEF tank level failure is in master ECU active.

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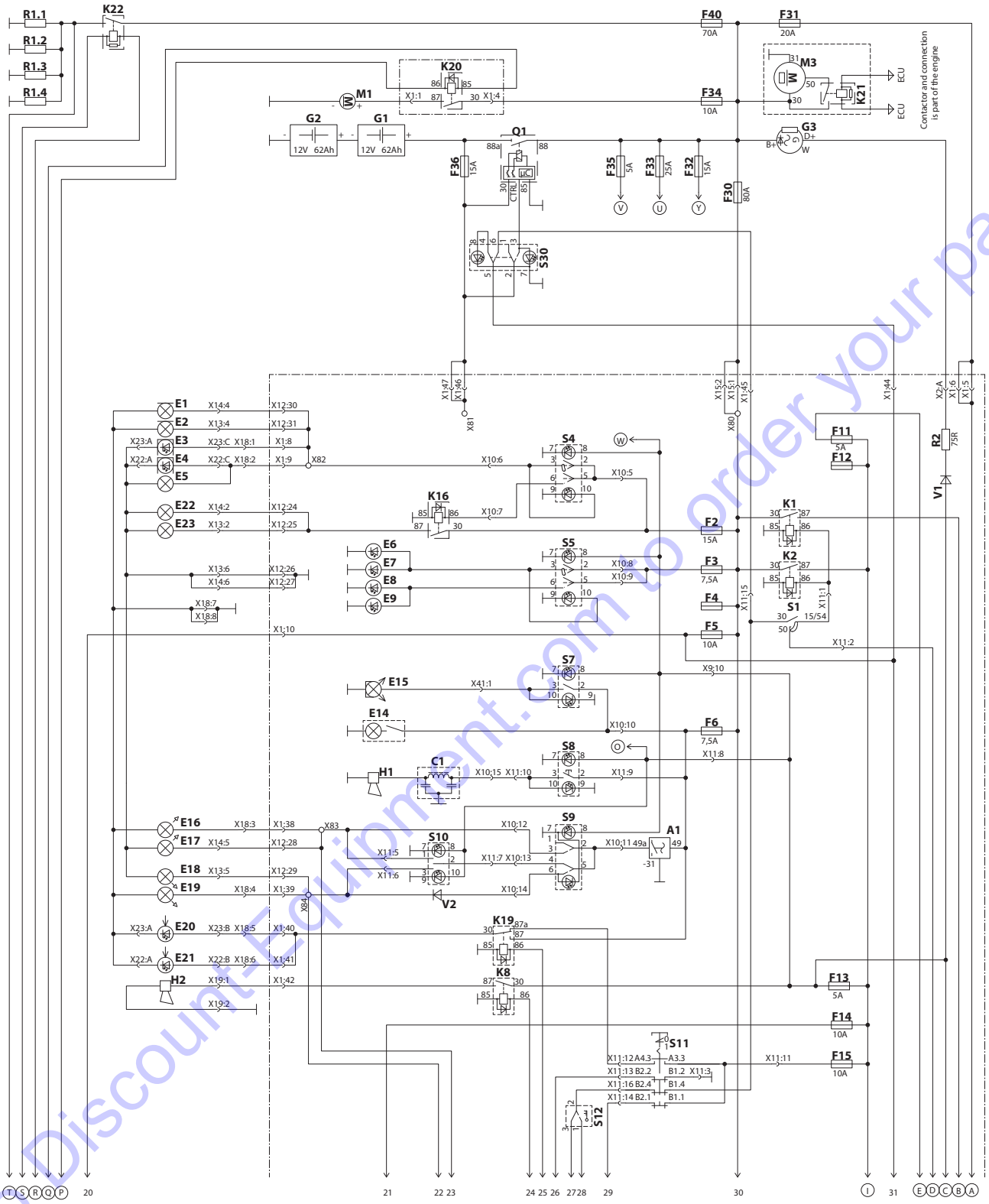
Error codes	SPN	FMI	Error description
1945	524204	11	SCR afterrun failure is in master ECU active.
1946	524205	11	SCR Co2Off failure is in master ECU active.
1947	524206	11	SCR disable DEF dosing failure is in master ECU active.
1971	524230	11	Inducement HW Failure Slave.
1972	524231	11	Inducement SCR Tamp. Slave
1973	524232	11	Inducement DEF Qualitity in Slave ECU
1974	524233	11	Urea Level Error Slave
1975	524234	11	Urea Temp. Error Slave
1976	524235	11	Urea Level Replace Slave
1977	524236	11	SCR System Afterrun Slave
1978	524237	11	NSwitch Off SCR System Slave
1979	524238	11	Disable SCR Dosing Slave
1980	524239	11	SCR regeneration failure is in slave ECU active.
1983	524242	11	Urea CONC Replace Slave
1984	524243	11	Urea Quality Error Slave
1989	524248	11	NOX sensor downstream error in slave ECU
1990	524249	11	DEF dosing valve error in slave ECU
1992	524251	11	DEF pressure problems in slave ECU
1993	524252	11	Reverting valve error in slave ECU
1994	524253	11	DEF back flow line heater error on slave ECU
1995	524254	11	Error NOx-Tailpipe emissions exceeded on Slave ECU
1996	524255	11	DEF suction line heater error on slave ECU
1997	524256	11	DEF supply module heater error on slave ECU
1998	524257	11	Error Exhaust pressure upstream SCR on Slave ECU.
1999	524258	11	Error Exhaust temperature upstream SCR on Slave ECU
2000	524259	11	DEF pressure line heater error on slave ECU
2001	524260	11	Error Urea pump temperature on Slave ECU
2002	524261	11	Error DEF heater relais on Slave ECU.
2003	524262	8	
2007	524267	14	Announcement triggers the Inducement Level 2
2008	524025	8	Max. launch time for stand still exceeded (60min).
2011	4171	2	Dynamic temperatur check of temp before SCR
2013	524147	13	„Set together with DFC_SCRCoBldUpLoPres. DFC_SCRCoBldUpLoPresRst is only used for inducement purposes. It ensures that legal inducement is working correctly.“
2014	3520	1	„Diluted DEF in the tank.

Wiring diagram

Seat switch; Tier 4f engine; ATC module; Murphy – Power view (the diagram corresponds to the machine version with the maximum number of control elements and accessories)

Legend:

A1 Direction light interrupter
A2 Control unit Rexroth RC20-10/30
A4 Travel control lever
A5 Display
A6 Deutsch engine control unit
A7 Air-conditioning
A8 Time relay of rear window heating
A9 Voltage transformer 24 V / 12 V
A10 Autoradio 12V
A11 Heating
A12 Front wiper intermittent
A13 Rear wiper intermittent
A14 Voltage transformer 24 V / 12 V Deutsch
A15 Relaybox
A16 Tachograph
A17 Adapter N1/M1
A18 Compaction module
A21 Pulse changer HA3050
A22 Voltage transformer 24V/12V
B1 Vibrator frequency sensor
B2 Left wheel speed sensor
B5 Inclinometer
B6 Fuel level indicator
B54 NOx sensor in front of SCR catalytic converter
B56 NOx sensor after SCR catalytic converter
B58 DPF differential pressure sensor
B65 Temperature of exhaust gases in front of OXY catalytic converter
B66 Temperature of exhaust gases after OXY catalytic converter
B78 Temperature of exhaust gases in front of SCR catalytic converter
B88 Pressure sensor after DPF module
B90 Urea sensor
C1 Noise suppressing filter
E1, E2 Front outline lights
E3, E4 Tail lights
E5 Number plate lighting
E6, E7 Front headlights (on the cabin)
E8, E9 Rear headlights (on the cabin)
E14 Cab lighting
E15 Beacon
E16, 17 Left direction lights
E18, 19 Right direction lights
E20, 21 Brake lights
E22, E23 Road lighting
E35 Green beacon
F1 Fuse for 12V sockets
F2-8 Fuses - switchboard (in front of the key)
F11-28 Fuses - switchboard (after the key)
F30 Main fuse
F31-35 Fuses - on the machine (in front of the key)
F36 Memory power supply fuse
F40 Pre-heating fuse
G1, 2 62 Ah battery
G3 Alternator 100
H1 Horn
H2 Back signal horn
H3 Right loudspeaker
H4 Left loudspeaker
K1, 2 Power relay
K10, 16 Relay
K8,11,19,20,28 - Micro relay
K22 Pre-heating contactor
M1 Fuel pump
M3 Starter
M6 Front windscreen wiper
M7 Rear windscreen wiper
M8 Front windscreen washer
M9 Rear windscreen washer
Q1 Electronic disconnector
R1 Pre-heating
R2 Resistor 75 Ω
R5,7,8 Resistor 120 Ω
R6 Rear window heating
R9 Heating flap valve 22 kΩ
R11,12 Resistor 1kΩ
R15 Suction circuit heating
R16 Return circuit heating
R17 Pressure circuit heating
S1 Ignition box
S4 Road lighting switch
S5 Headlights switch on the cabin
S7 Beacon switch
S8 Horn button
S9 Warning lights switch
S10 Turn indicators switch
S11 Emergency brake
S12 Service switch
S13 Hydraulic oil fuel level
S14 Pressure parking brake switch
S15 Hydraulic oil temperature switch
S16 Hydraulic oil filter pressure switch
S17 Seat switch
S18 Vibration switch Small/Big
S19 Vibration switch Manual/ Automatic
S30 Electronic disconnector switch
S35 Air suction temperature
S36 Coolant level switch
S37 Air filter clogging pressure switch
S38 Water in fuel switch
S40 Heater fan switch
S41 Front wiper switch
S42 Rear wiper switch
S43 Screen washer switch
S44 Rear window heating switch
S47 Air-condition overpressure safety element
S49 Fuel filter sensor
S51 Seat belt sensor
V Rectifier diodes
X34-35 Mounting 12V sockets
X36 Engine diagnostic socket
X64 Diagnostic socket CAN1
X65 Diagnostic socket CAN2
X68 Diagnostic socket of display
Y5 Cooling fan electromagnet
Y6 Differential lock electromagnet RTM
Y8 Vibration electromagnet - small
Y9 Vibration electromagnet - big
Y10 Fast travel electromagnet - drum
Y11 Fast travel electromagnet - left wheel
Y12 Fast travel electromagnet - right wheel
Y13 Travel electromagnet -reverse
Y14 Travel electromagnet- forward
Y15 Parking brake electromagnet
Y16 Blade electromagnet - up
Y17 Blade electromagnet - down
Y18-19 Blade electromagnet - floating position
Y23 Air-conditioning compressor coupling electromagnet
Y24 Urea dosing valve electromagnet
Y31 Urea tank heating



35540B_1en

Wiring diagram

Seat switch; Tier 4f engine; ATC module; Murphy – Power view (the diagram corresponds to the machine version with the maximum number of control elements and accessories)

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M7 Rear windscreen wiper
M8 Front windscreen washer
M9 Rear windscreen washer
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R1 Pre-heating
R2 Resistor 75 Ω
R5,7,8 Resistor 120 Ω
R6 Rear window heating
R9 Heating flap valve 22 kΩ
R11,12 Resistor 1kΩ
R15 Suction circuit heating
R16 Return circuit heating
R17 Pressure circuit heating
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S10 Turn indicators switch
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S12 Service switch
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S14 Pressure parking brake switch
S15 Hydraulic oil temperature switch
S16 Hydraulic oil filter pressure switch
S17 Seat switch
S18 Vibration switch Small/Big
S19 Vibration switch Manual/ Automatic
S30 Electronic disconnector switch
S35 Air suction temperature
S36 Coolant level switch
S37 Air filter clogging pressure switch
S38 Water in fuel switch
S40 Heater fan switch
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S43 Screen washer switch
S44 Rear window heating switch
S47 Air-condition overpressure safety element
S49 Fuel filter sensor
S51 Seat belt sensor
V Rectifier diodes
X34-35 Mounting 12V sockets
X36 Engine diagnostic socket
X64 Diagnostic socket CAN1
X65 Diagnostic socket CAN2
X68 Diagnostic socket of display
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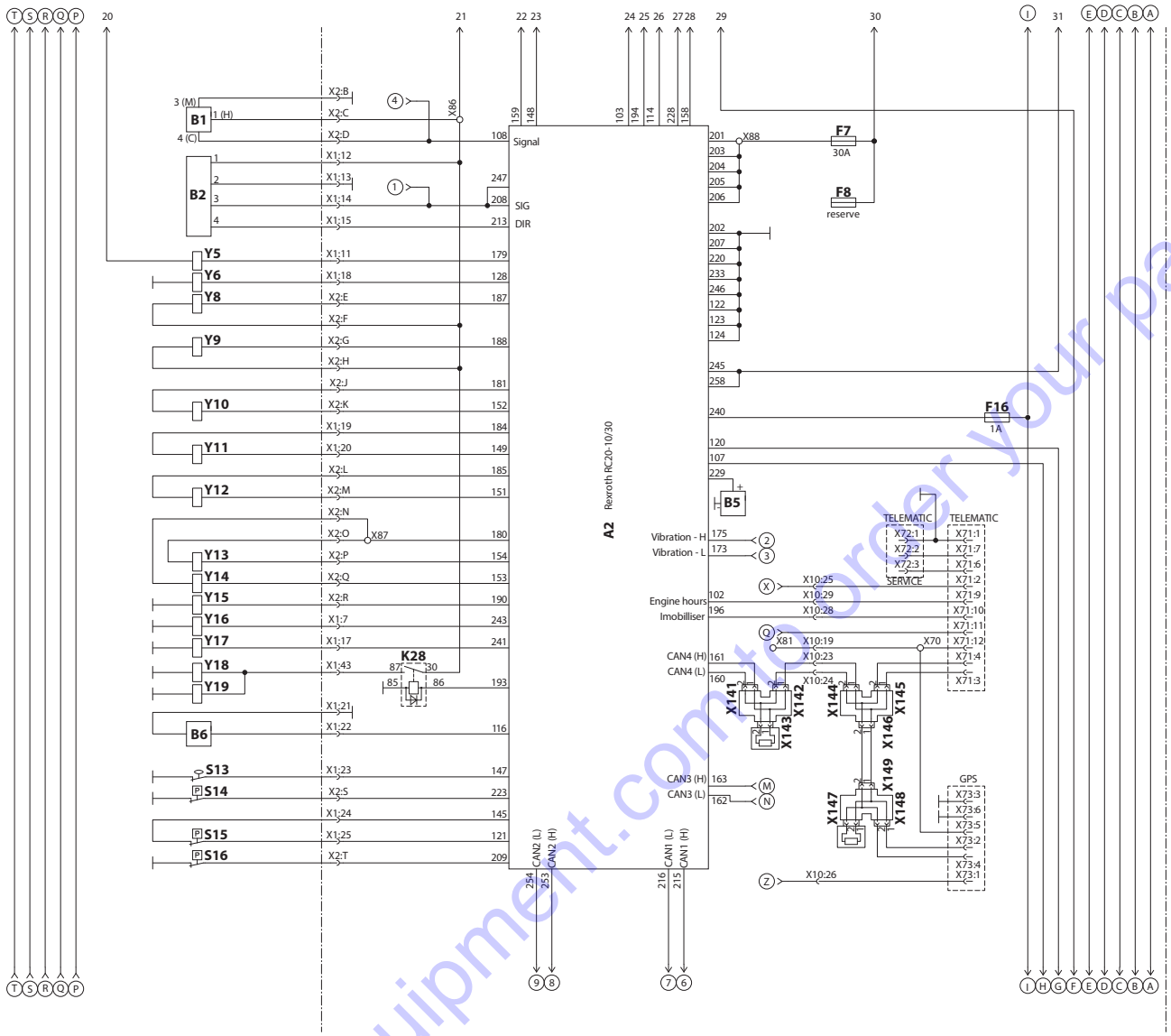
Y6 Differential lock electromagnet RTM
Y8 Vibration electromagnet - small
Y9 Vibration electromagnet - big
Y10 Fast travel electromagnet - drum
Y11 Fast travel electromagnet - left wheel
Y12 Fast travel electromagnet - right wheel
Y13 Travel electromagnet -reverse
Y14 Travel electromagnet- forward
Y15 Parking brake electromagnet
Y16 Blade electromagnet - up
Y17 Blade electromagnet - down
Y18-19 Blade electromagnet - floating position
Y23 Air-conditioning compressor coupling electromagnet
Y24 Urea dosing valve electromagnet
Y31 Urea tank heating



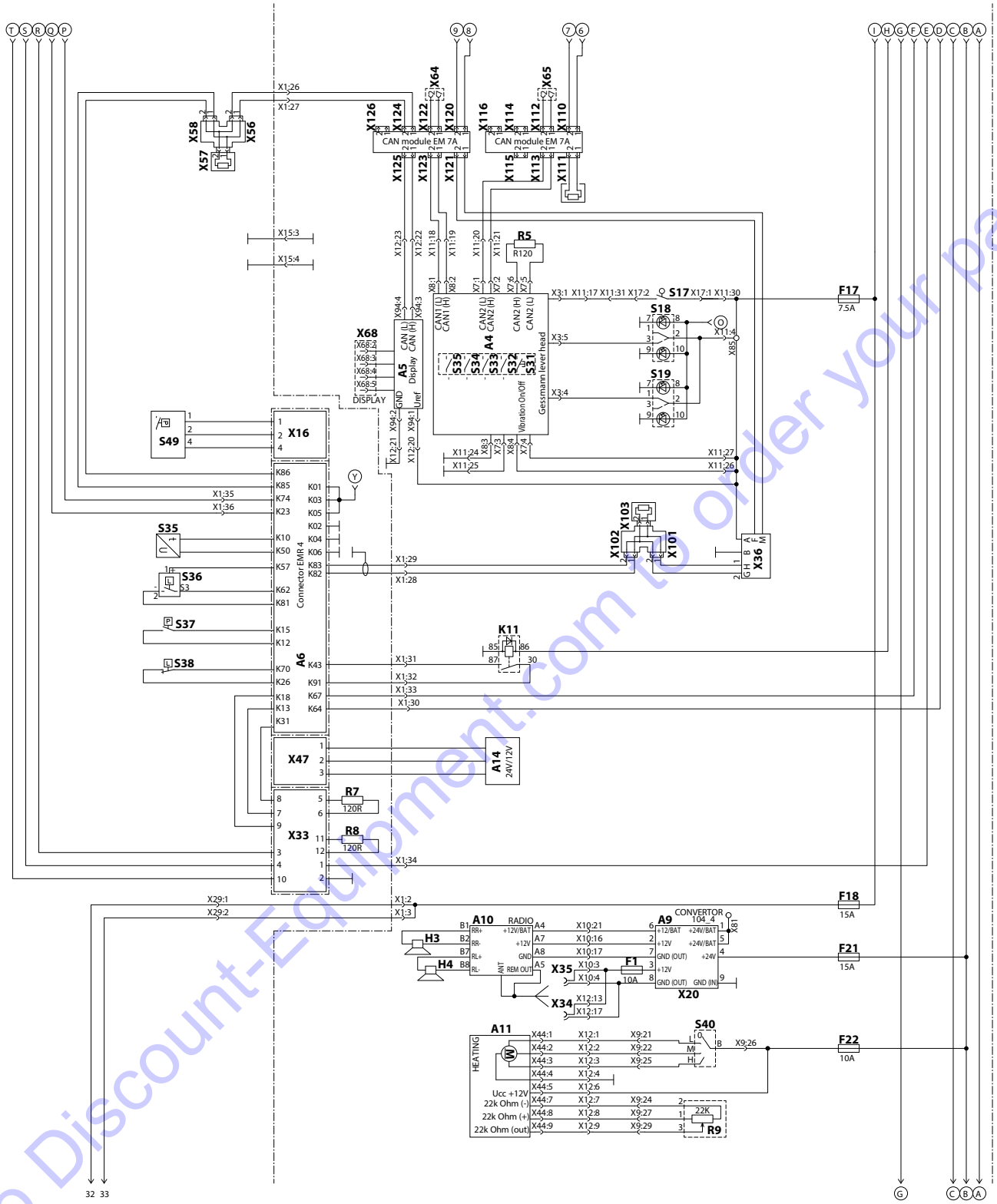
35540B_2en

Wiring diagram

Seat switch; Tier 4f engine; ATC module; Murphy – Power view (the diagram corresponds to the machine version with the maximum number of control elements and accessories)

Legend:

A1 Direction light interrupter
A2 Control unit Rexroth RC20-10/30
A4 Travel control lever
A5 Display
A6 Deutsch engine control unit
A7 Air-conditioning
A8 Time relay of rear window heating
A9 Voltage transformer 24 V / 12 V
A10 Autoradio 12V
A11 Heating
A12 Front wiper intermittent
A13 Rear wiper intermittent
A14 Voltage transformer 24 V / 12 V Deutsch
A15 Relaybox
A16 Tachograph
A17 Adapter N1/M1
A18 Compaction module
A21 Pulse changer HA3050
A22 Voltage transformer 24V/12V
B1 Vibrator frequency sensor
B2 Left wheel speed sensor
B5 Inclinometer
B6 Fuel level indicator
B54 NOx sensor in front of SCR catalytic converter
B56 NOx sensor after SCR catalytic converter
B58 DPF differential pressure sensor
B65 Temperature of exhaust gases in front of OXY catalytic converter
B66 Temperature of exhaust gases after OXY catalytic converter
B78 Temperature of exhaust gases in front of SCR catalytic converter
B88 Pressure sensor after DPF module
B90 Urea sensor
C1 Noise suppressing filter
E1, E2 Front outline lights
E3, E4 Tail lights
E5 Number plate lighting
E6, E7 Front headlights (on the cabin)
E8, E9 Rear headlights (on the cabin)
E14 Cab lighting
E15 Beacon
E16, 17 Left direction lights
E18, 19 Right direction lights
E20, 21 Brake lights
E22, E23 Road lighting
E35 Green beacon
F1 Fuse for 12V sockets
F2-8 Fuses - switchboard (in front of the key)
F11-28 Fuses - switchboard (after the key)
F30 Main fuse
F31-35 Fuses - on the machine (in front of the key)
F36 Memory power supply fuse
F40 Pre-heating fuse
G1, 2 62 Ah battery
G3 Alternator 100
H1 Horn
H2 Back signal horn
H3 Right loudspeaker
H4 Left loudspeaker
K1, 2 Power relay
K10, 16 Relay
K8,11,19,20,28 - Micro relay
K22 Pre-heating contactor
M1 Fuel pump
M3 Starter
M6 Front windscreen wiper
M7 Rear windscreen wiper
M8 Front windscreen washer
M9 Rear windscreen washer
Q1 Electronic disconnector
R1 Pre-heating
R2 Resistor 75 Ω
R5,7,8 Resistor 120 Ω
R6 Rear window heating
R9 Heating flap valve 22 kΩ
R11,12 Resistor 1kΩ
R15 Suction circuit heating
R16 Return circuit heating
R17 Pressure circuit heating
S1 Ignition box
S4 Road lighting switch
S5 Headlights switch on the cabin
S7 Beacon switch
S8 Horn button
S9 Warning lights switch
S10 Turn indicators switch
S11 Emergency brake
S12 Service switch
S13 Hydraulic oil fuel level
S14 Pressure parking brake switch
S15 Hydraulic oil temperature switch
S16 Hydraulic oil filter pressure switch
S17 Seat switch
S18 Vibration switch Small/Big
S19 Vibration switch Manual/ Automatic
S30 Electronic disconnector switch
S35 Air suction temperature
S36 Coolant level switch
S37 Air filter clogging pressure switch
S38 Water in fuel switch
S40 Heater fan switch
S41 Front wiper switch
S42 Rear wiper switch
S43 Screen washer switch
S44 Rear window heating switch
S47 Air-condition overpressure safety element
S49 Fuel filter sensor
S51 Seat belt sensor
V Rectifier diodes
X34-35 Mounting 12V sockets
X36 Engine diagnostic socket
X64 Diagnostic socket CAN1
X65 Diagnostic socket CAN2
X68 Diagnostic socket of display
Y5 Cooling fan electromagnet
Y6 Differential lock electromagnet RTM
Y8 Vibration electromagnet - small
Y9 Vibration electromagnet - big
Y10 Fast travel electromagnet - drum
Y11 Fast travel electromagnet - left wheel
Y12 Fast travel electromagnet - right wheel
Y13 Travel electromagnet -reverse
Y14 Travel electromagnet- forward
Y15 Parking brake electromagnet
Y16 Blade electromagnet - up
Y17 Blade electromagnet - down
Y18-19 Blade electromagnet - floating position
Y23 Air-conditioning compressor coupling electromagnet
Y24 Urea dosing valve electromagnet
Y31 Urea tank heating



35540B_3en

Wiring diagram

Seat switch; Tier 4f engine; ATC module; Murphy – Power view (the diagram corresponds to the machine version with the maximum number of control elements and accessories)

Legend:

A1 Direction light interrupter
A2 Control unit Rexroth RC20-10/30
A4 Travel control lever
A5 Display
A6 Deutsch engine control unit
A7 Air-conditioning
A8 Time relay of rear window heating
A9 Voltage transformer 24 V / 12 V
A10 Autoradio 12V
A11 Heating
A12 Front wiper intermittent
A13 Rear wiper intermittent
A14 Voltage transformer 24 V / 12 V Deutsch
A15 Relaybox
A16 Tachograph
A17 Adapter N1/M1
A18 Compaction module
A21 Pulse changer HA3050
A22 Voltage transformer 24V/12V
B1 Vibrator frequency sensor
B2 Left wheel speed sensor
B5 Inclinometer
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F36 Memory power supply fuse
F40 Pre-heating fuse
G1, 2 62 Ah battery
G3 Alternator 100
H1 Horn
H2 Back signal horn
H3 Right loudspeaker
H4 Left loudspeaker
K1, 2 Power relay
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K8,11,19,20,28 - Micro relay
K22 Pre-heating contactor
M1 Fuel pump
M3 Starter
M6 Front windscreen wiper
M7 Rear windscreen wiper
M8 Front windscreen washer
M9 Rear windscreen washer
Q1 Electronic disconnector
R1 Pre-heating
R2 Resistor 75 Ω
R5,7,8 Resistor 120 Ω
R6 Rear window heating
R9 Heating flap valve 22 kΩ
R11,12 Resistor 1kΩ
R15 Suction circuit heating
R16 Return circuit heating
R17 Pressure circuit heating
S1 Ignition box
S4 Road lighting switch
S5 Headlights switch on the cabin
S7 Beacon switch
S8 Horn button
S9 Warning lights switch
S10 Turn indicators switch
S11 Emergency brake
S12 Service switch
S13 Hydraulic oil fuel level
S14 Pressure parking brake switch
S15 Hydraulic oil temperature switch
S16 Hydraulic oil filter pressure switch
S17 Seat switch
S18 Vibration switch Small/Big
S19 Vibration switch Manual/ Automatic
S30 Electronic disconnector switch
S35 Air suction temperature
S36 Coolant level switch
S37 Air filter clogging pressure switch
S38 Water in fuel switch
S40 Heater fan switch
S41 Front wiper switch
S42 Rear wiper switch
S43 Screen washer switch
S44 Rear window heating switch
S47 Air-condition overpressure safety element
S49 Fuel filter sensor
S51 Seat belt sensor
V Rectifier diodes
X34-35 Mounting 12V sockets
X36 Engine diagnostic socket
X64 Diagnostic socket CAN1
X65 Diagnostic socket CAN2
X68 Diagnostic socket of display
Y5 Cooling fan electromagnet
Y6 Differential lock electromagnet RTM
Y8 Vibration electromagnet - small
Y9 Vibration electromagnet - big
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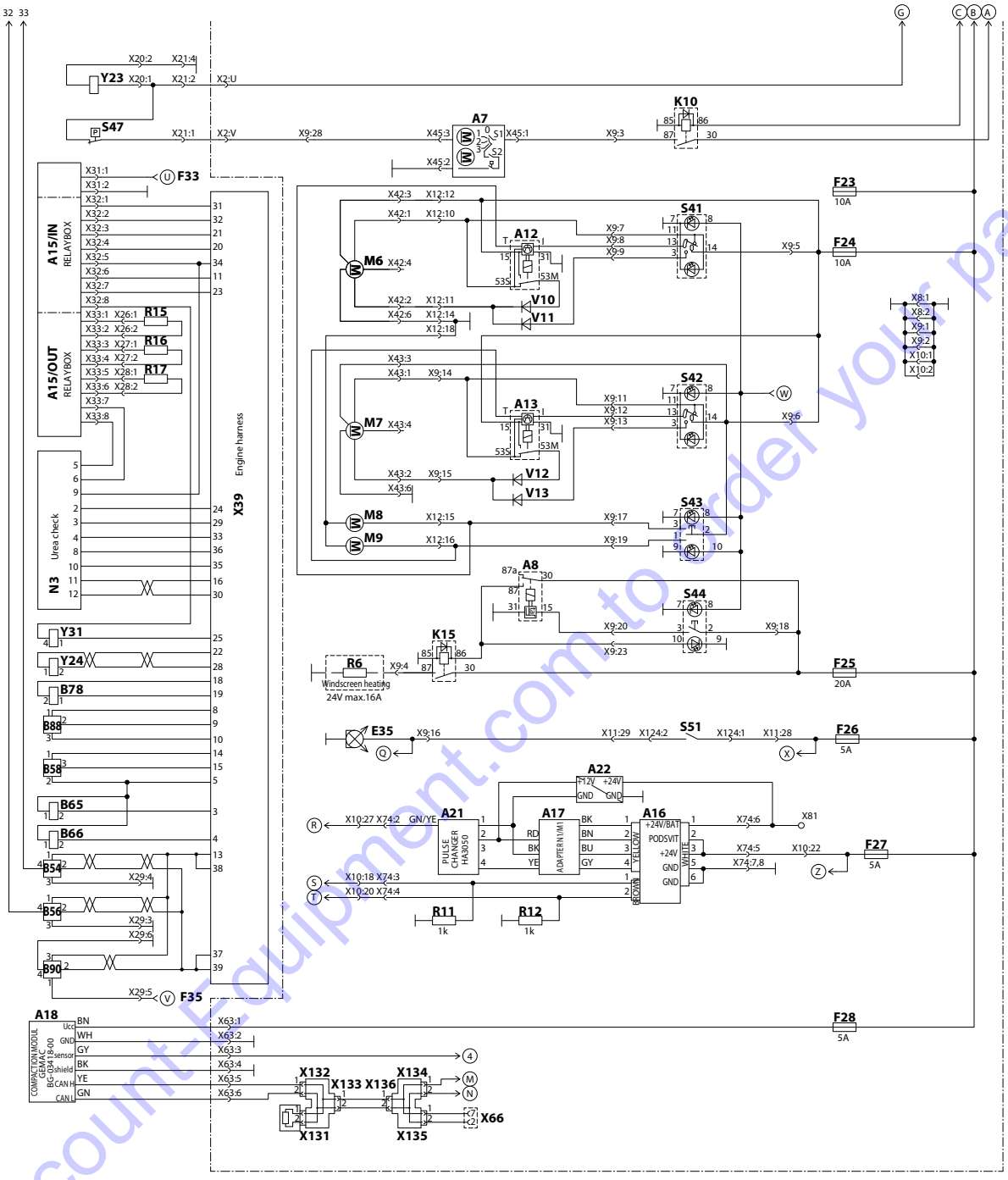
Y11 Fast travel electromagnet - left wheel
Y12 Fast travel electromagnet - right wheel
Y13 Travel electromagnet -reverse
Y14 Travel electromagnet- forward
Y15 Parking brake electromagnet
Y16 Blade electromagnet - up
Y17 Blade electromagnet - down
Y18-19 Blade electromagnet - floating position
Y23 Air-conditioning compressor coupling electromagnet
Y24 Urea dosing valve electromagnet
Y31 Urea tank heating

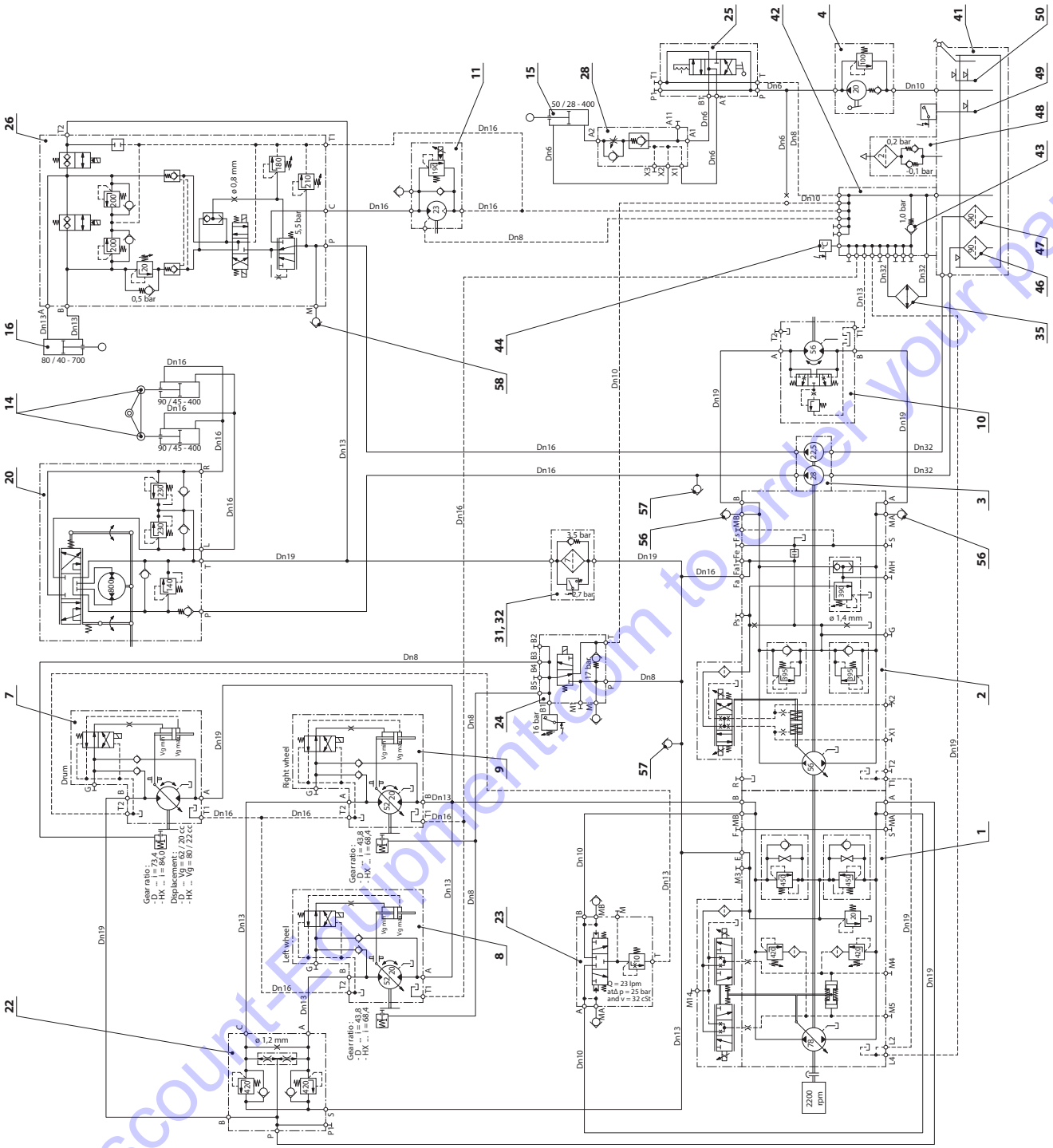


35540B_4en

3.8.2 Hydraulic diagram – wheel lock (Danfoss)

Legend:

1. Travel pump
2. Vibration pump
3. Steering and cooling pump
4. Hand pump
7. Travel hydraulic motor - drum
8. Travel hydraulic motor – left wheel
9. Travel hydraulic motor – right wheel
10. Vibration hydraulic motor
11. Fan drive motor
14. Steering hydraulic cylinder
15. Cab lifting hydraulic cylinder
16. Dozer blade hydraulic cylinder
20. Steering unit
22. Flow divider
23. Flushing valve
24. Brake hydraulic block
25. Cab lifting hydraulic block
26. Dozer blade hydraulic block
28. Throttle check valve
31. Hydraulic filter - head
32. Hydraulic filter – filter element
35. Combined cooler
41. Hydraulic tank
42. Return line manifold
43. Check valve
44. Temperature sensor
46. Strainer
47. Strainer
48. Ventilating filter
49. Float switch
50. Oil level indicator
54. Filling quick coupling
56. Test coupling
57. Test coupling
58. Test coupling

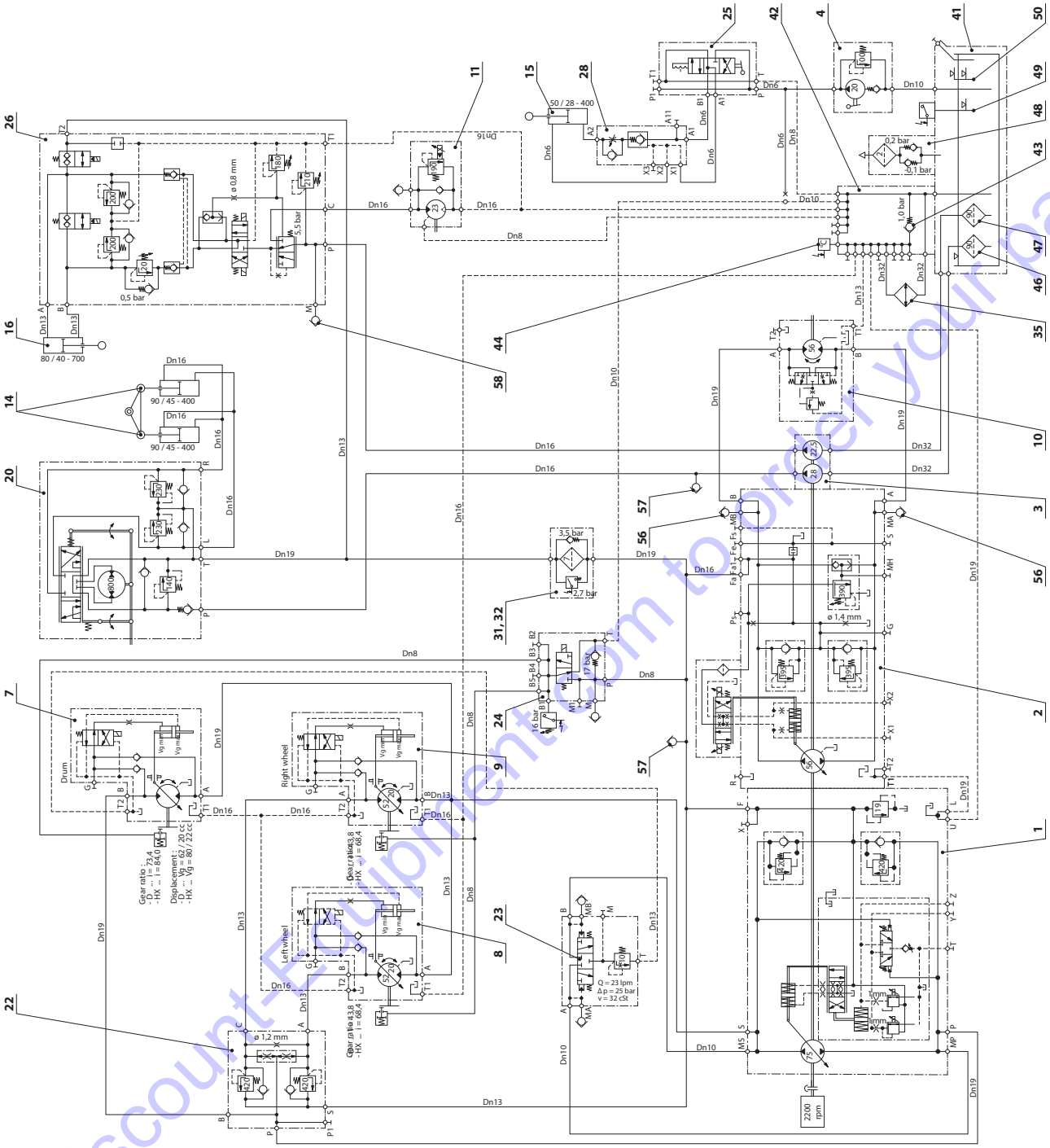


43673Aen

3.8.3 Hydraulic diagram – wheel lock (Linde)

Legend:

1. Travel pump
2. Vibration pump
3. Steering and cooling pump
4. Hand pump
7. Travel hydraulic motor - drum
8. Travel hydraulic motor – left wheel
9. Travel hydraulic motor – right wheel
10. Vibration hydraulic motor
11. Fan drive motor
14. Steering hydraulic cylinder
15. Cab lifting hydraulic cylinder
16. Dozer blade hydraulic cylinder
20. Steering unit
22. Flow divider
23. Flushing valve
24. Brake hydraulic block
25. Cab lifting hydraulic block
26. Dozer blade hydraulic block
28. Throttle check valve
31. Hydraulic filter - head
32. Hydraulic filter – filter element
35. Combined cooler
41. Hydraulic tank
42. Return line manifold
43. Check valve
44. Temperature sensor
46. Strainer
47. Strainer
48. Ventilating filter
49. Float switch
50. Oil level indicator
54. Filling quick coupling
56. Test coupling
57. Test coupling
58. Test coupling

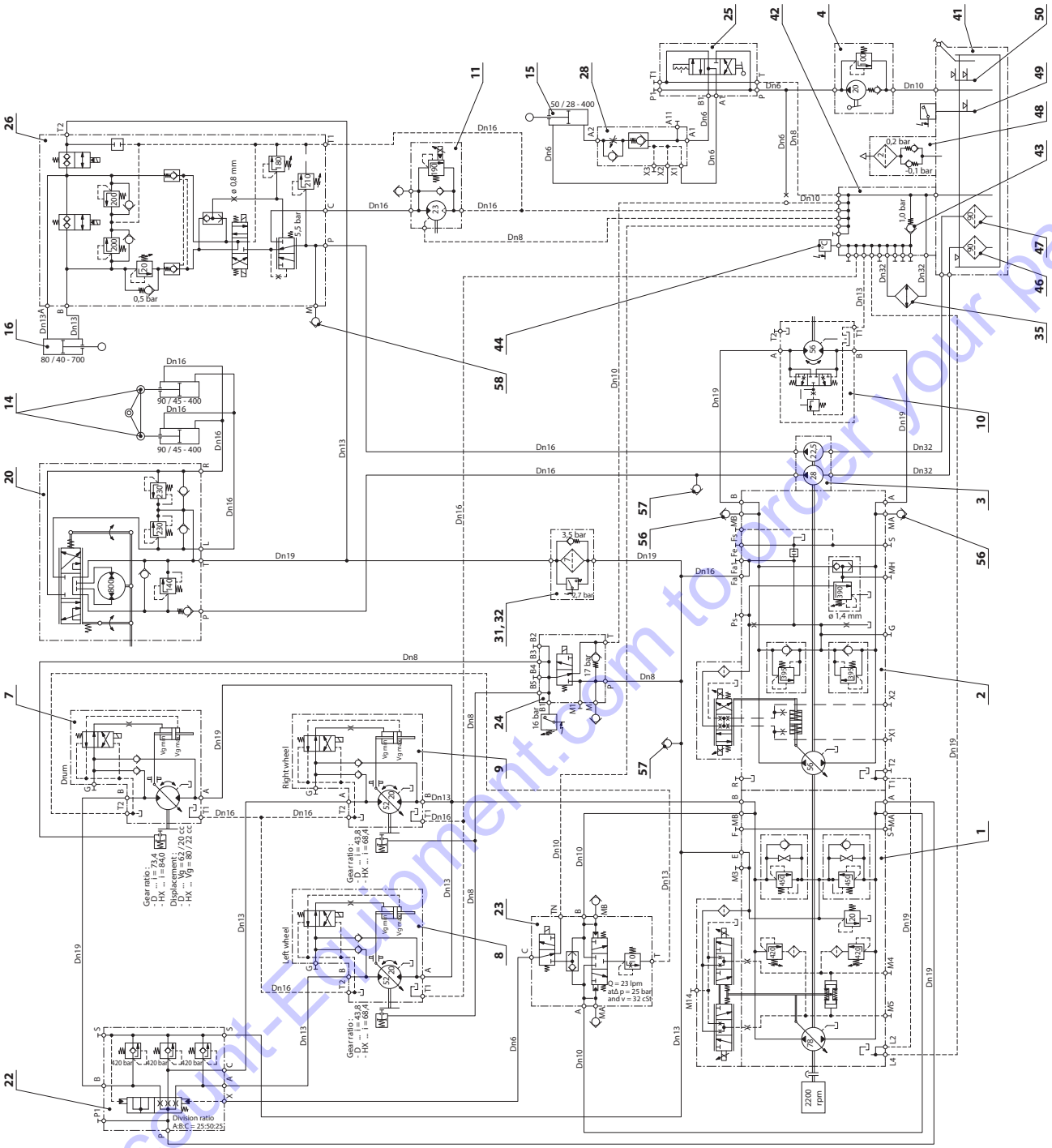


46024en

3.8.4 Hydraulic diagram – complete ATC (Danfoss)

Legend:

1. Travel pump
2. Vibration pump
3. Steering and cooling pump
4. Hand pump
7. Travel hydraulic motor - drum
8. Travel hydraulic motor – left wheel
9. Travel hydraulic motor – right wheel
10. Vibration hydraulic motor
11. Fan drive motor
14. Steering hydraulic cylinder
15. Cab lifting hydraulic cylinder
16. Dozer blade hydraulic cylinder
20. Steering unit
22. Flow divider
23. Flushing valve and control of RTM
24. Brake hydraulic block
25. Cab lifting hydraulic block
26. Dozer blade hydraulic block
28. Throttle check valve
31. Hydraulic filter - head
32. Hydraulic filter – filter element
35. Combined cooler
41. Hydraulic tank
42. Return line manifold
43. Check valve
44. Temperature sensor
46. Strainer
47. Strainer
48. Ventilating filter
49. Float switch
50. Oil level indicator
54. Filling quick coupling
56. Test coupling
57. Test coupling
58. Test coupling

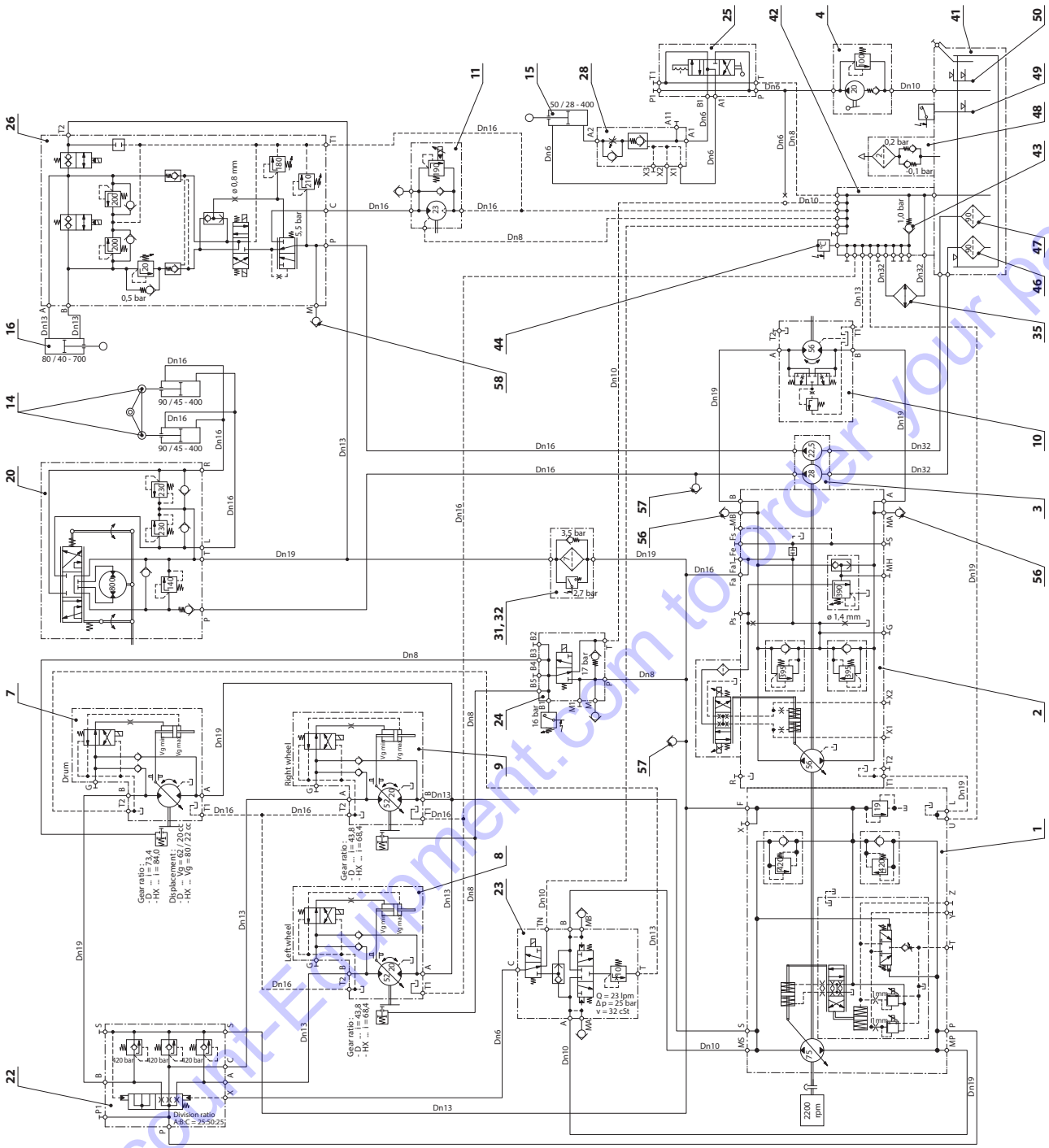


43674Aen

3.8.5 Hydraulic diagram – complete ATC (Linde)

Legend:

1. Travel pump
2. Vibration pump
3. Steering and cooling pump
4. Hand pump
7. Travel hydraulic motor - drum
8. Travel hydraulic motor – left wheel
9. Travel hydraulic motor – right wheel
10. Vibration hydraulic motor
11. Fan drive motor
14. Steering hydraulic cylinder
15. Cab lifting hydraulic cylinder
16. Dozer blade hydraulic cylinder
20. Steering unit
22. Flow divider
23. Flushing valve and control of RTM
24. Brake hydraulic block
25. Cab lifting hydraulic block
26. Dozer blade hydraulic block
28. Throttle check valve
31. Hydraulic filter - head
32. Hydraulic filter – filter element
35. Combined cooler
41. Hydraulic tank
42. Return line manifold
43. Check valve
44. Temperature sensor
46. Strainer
47. Strainer
48. Ventilating filter
49. Float switch
50. Oil level indicator
54. Filling quick coupling
56. Test coupling
57. Test coupling
58. Test coupling



46025en

3.8.6 Table of spare parts

Chapter	Spare part	Order number
Every 20 hours of operation (daily)		
3.6.7	Dust valve	1-952454
Every 250 hours of operation		
3.6.14	Sensor	4-5358520063
Every 500 hours of operation, but at least once a year		
3.6.21	Oil filter	5-0020003
3.6.22	Fuel filter	1238008
3.6.22	Fuel filter	1229401
3.6.23	Air filter element (set)	1229388
3.6.23	Dust valve	1-952454
3.6.25	Air filter	1583817
3.6.27	Air-conditioning filter	4-32925
Every 1,000 hours of operation		
3.6.30	Filter element	1391087
3.6.36	Rubber metal element (D)	4-9200000030
3.6.36	Rubber metal element (HX)	4-9200000031
3.6.36	Rubber metal element	1402721
3.6.36	Rubber metal element	1403130
3.6.36	Rubber metal element	1317353
3.6.36	Rubber metal element	1221077
Every 2,000 hours of operation		
3.6.41	Sealing tape	4-5422250006
3.6.41	Filter element	4-5358520121
3.6.41	Hydraulic unit 230 V	1251998
3.6.41	Hydraulic unit 110 V	1255297
3.6.41	Temperature sensor	1234999
3.6.42	Ventilation filter	1280287
3.6.43	Vent plug	1281431

Content of the filter set after 500 hours (4-760269)

Chapter	Spare part	Number of parts	Order number
3.6.21	Oil filter	1	5-0020003
3.6.22	Fuel filter	1	1238008
3.6.22	Fuel filter	1	1229401
3.6.23	Air filter element (set)	1	1229388
3.6.25	Air filter	1	1583817
3.6.27	Filter	1	4-32925

Content of the filter set after 1000 hours (4-760274)

Chapter	Spare part	Number of parts	Order number
3.6.21	Oil filter	1	5-0020003
3.6.22	Fuel filter	1	1238008
3.6.22	Fuel filter	1	1229401
3.6.23	Air filter element (set)	1	1229388
3.6.25	Air filter	1	1583817
3.6.27	Filter	1	4-32925
3.6.30	Filter element	1	1391087

Content of the filter set after 2000 hours (4-760270)

Chapter	Spare part	Number of parts	Order number
3.6.21	Oil filter	1	5-0020003
3.6.22	Fuel filter	1	1238008
3.6.22	Fuel filter	1	1229401
3.6.23	Air filter element (set)	1	1229388
3.6.25	Air filter	1	1583817
3.6.27	Filter	1	4-32925
3.6.30	Filter element	1	1391087
3.6.41	Hydraulic oil filter	1	4-5358520121
3.6.42	Ventilation filter	1	1280287
3.6.43	Vent filter	1	1281431

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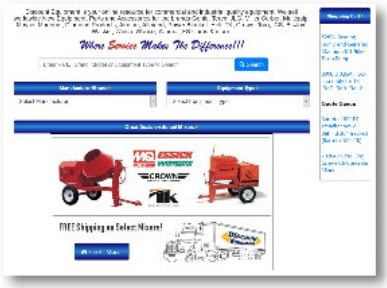

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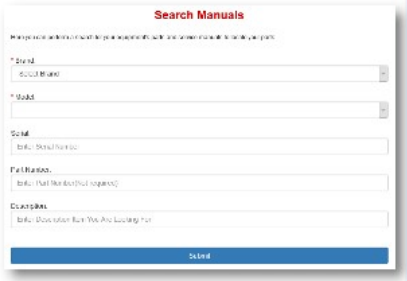

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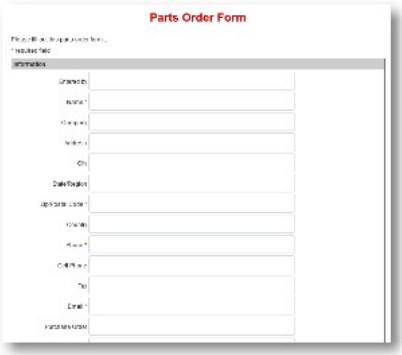

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