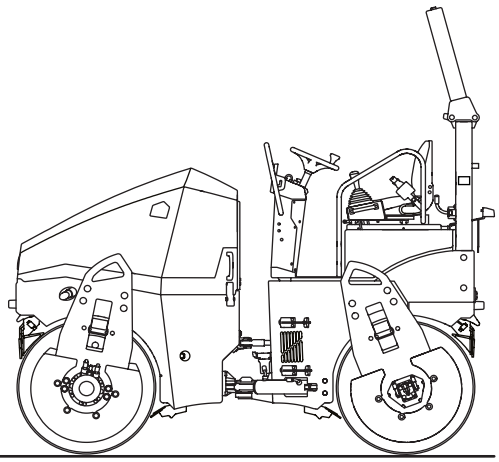
ARX 36-2
ARX 40-2
ARX 45-2

LIGHT TANDEM ROLLER
KUBOTA D1803-CR-TE5B
EU Stage V / U.S. EPA Tier 4f



OPERATING MANUAL

EDITION 01/2025 EN
ARX 36-2 KU St V / T4f Product Identification Number 3102211 -
ARX 40-2 KU St V / T4f Product Identification Number 3102639 -
ARX 45-2 KU St V / T4f Product Identification Number 3102213 -

AMMANN

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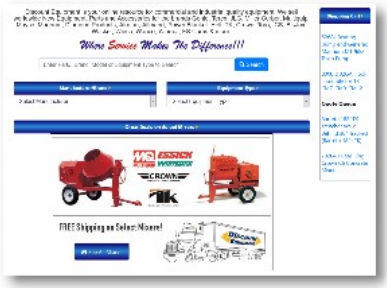

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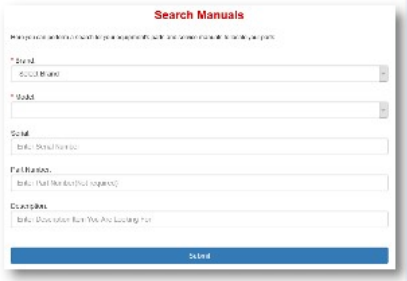

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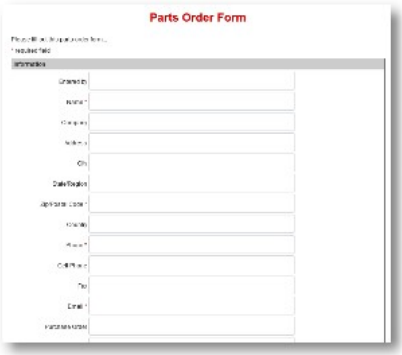

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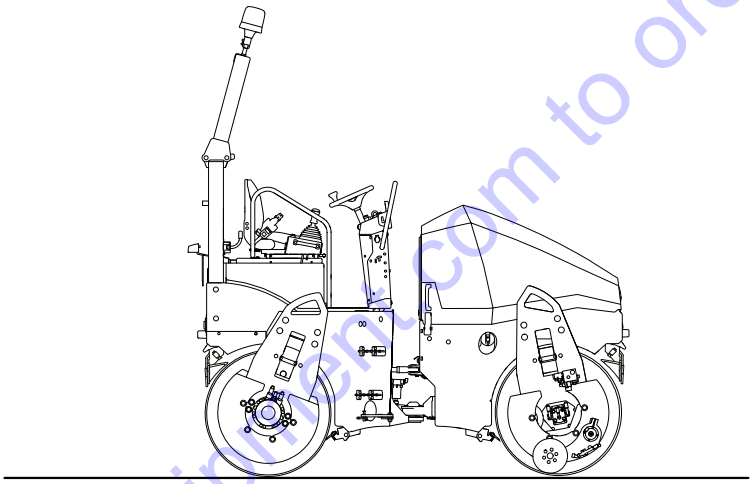
Congratulations on your purchase of the AMMANN compaction machine. This modern compaction machine is characterised by simple operation and maintenance and is the product of many years of experience of the AMMANN company in compaction machines, especially road rollers. In order to avoid faults due to 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 the operator with safe operation of the roller and provide him 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 NOTICE SIGNS

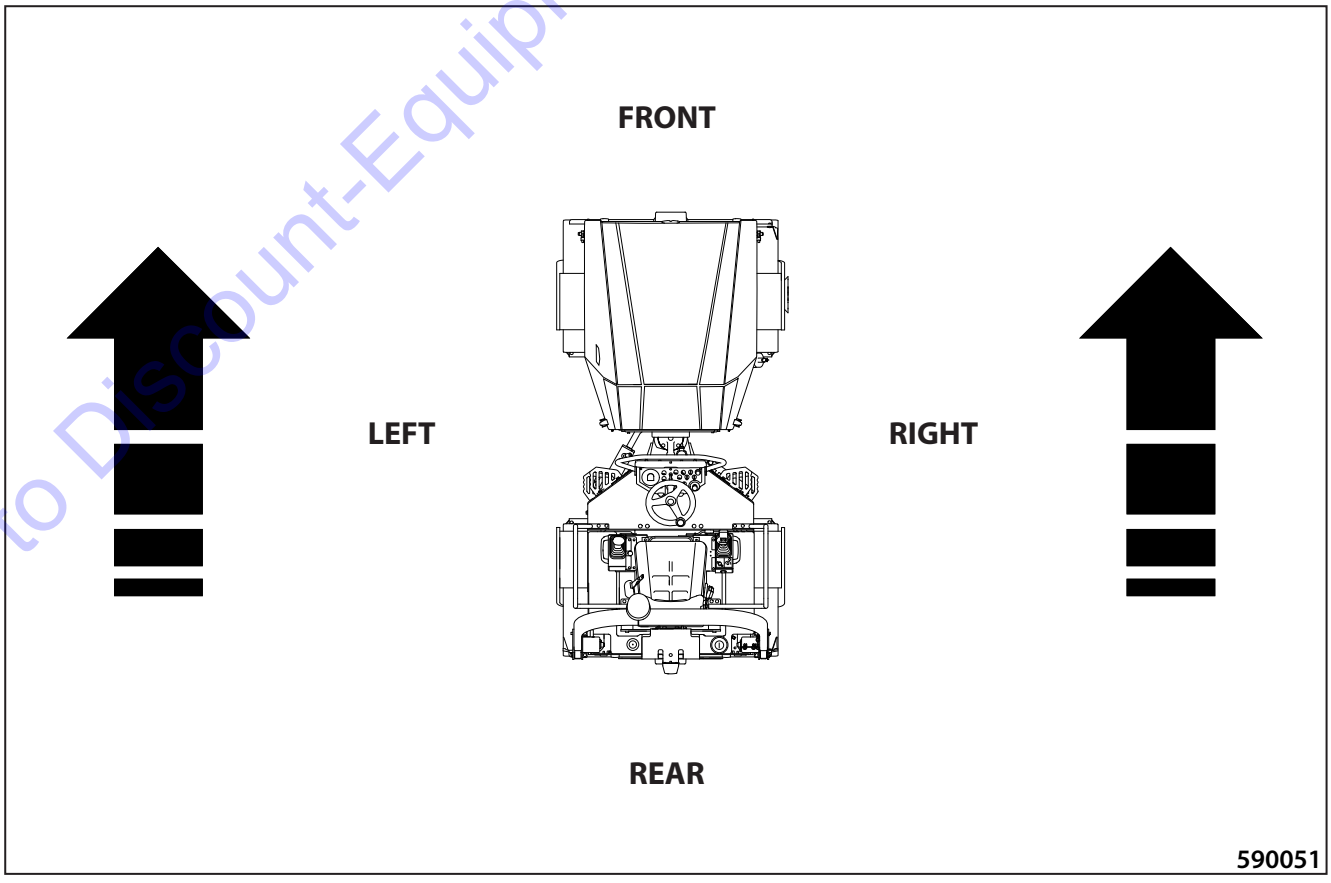
The notice warns of a serious risk of personal injury or other personal hazards.

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

The notice warns of the necessity of environmental protection.

! CAUTION !

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



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1 SPECIFICATION MANUAL

ARX 36-2
ARX 40-2
ARX 45-2
(Kubota Tier 4 Final)

1.1 Basic data

Machine description

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

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

Specification of the expected use of the machine

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

ARX 36-2 / ARX 40-2 / ARX 45-2 - The machine is suitable for compacting asphalt mixes up to the (compacted) layer thickness of 150 mm (5.9"), mixed soils up to the layer thickness of 200 mm (7.9") or sandy and gritty materials up to the layer thickness of 300 mm (11.8").

ARX 40-2C / ARX 45-2C - The machine is suitable for compacting asphalt mixes up to the (compacted) layer thickness of 120 mm (4.7 in), mixed soils up to the layer thickness of 180 mm (7.1 in) or sand and gravel materials up to the layer thickness of 250 mm (9.8 in).

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

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

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

Please fill in the following data:

(see Pin label, Label of the Kubota engine)

Type of machine

.....

Product Identification Number

.....

Year of manufacture

.....

Engine type

.....

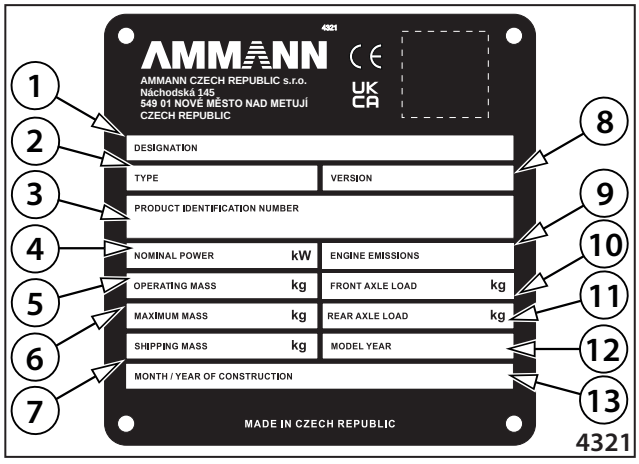
Serial number of the engine

.....

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

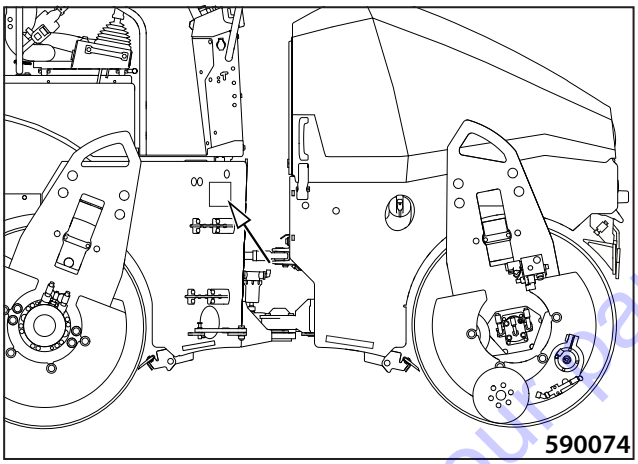
The machine that complies with the requirements as to health protection and safety is identified with a name plate with CE marking.

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

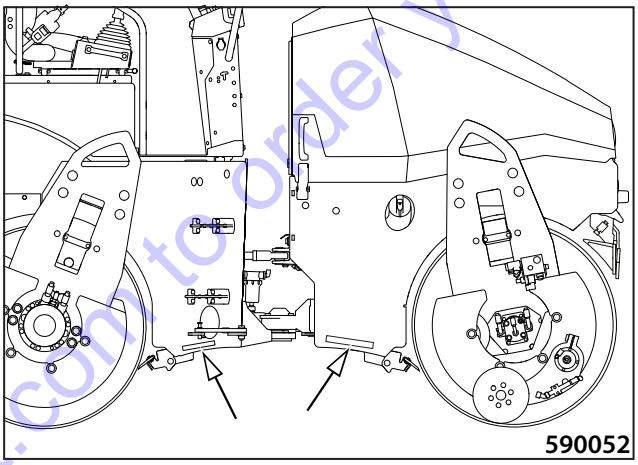


Nameplate position

Nameplate

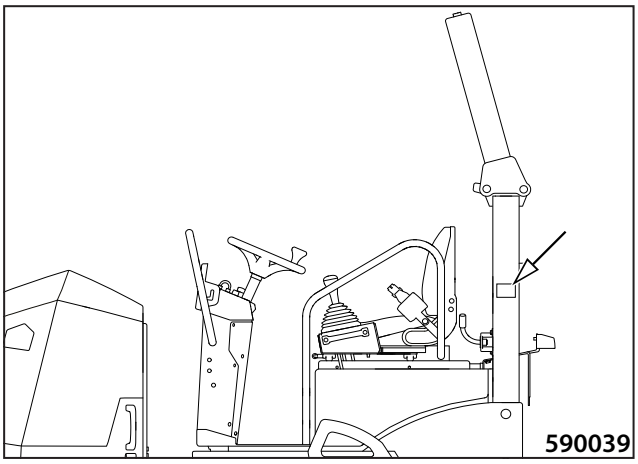


Serial number of the machine frame



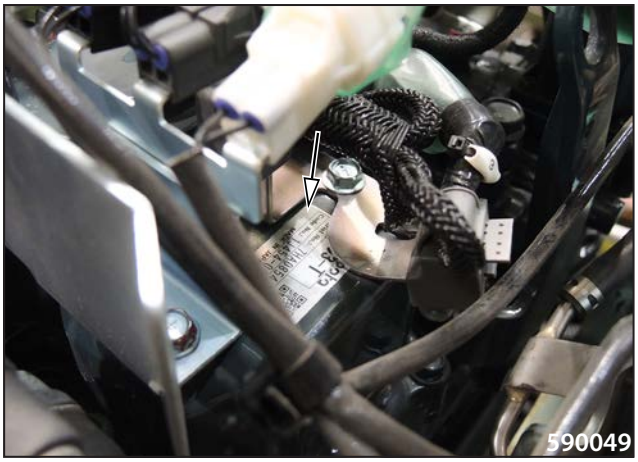
Position of the ROPS nameplate

ROPS nameplate

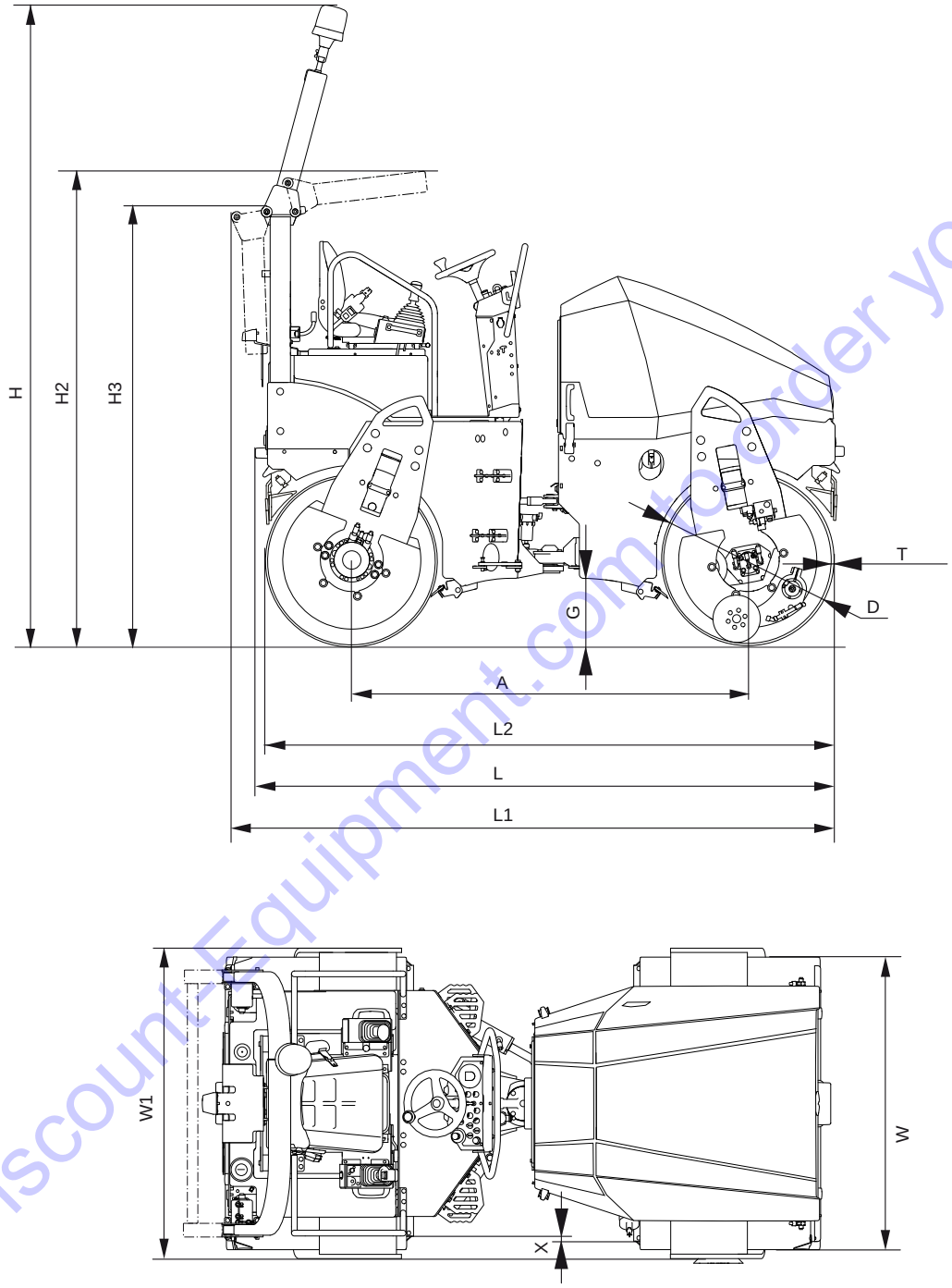


Engine nameplate position

Serial number of the Kubota engine



1.2 Dimensional drawing of the machine



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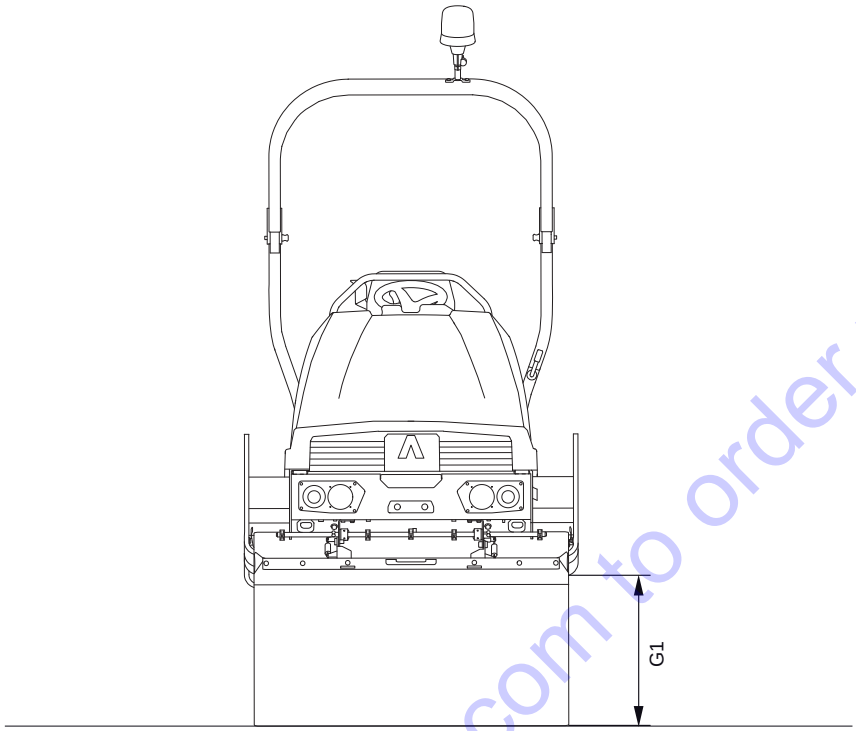

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mm (in)	ARX36-2		ARX40-2		ARX40-2C		ARX45-2		ARX45-2C	
	EU Stage V / U.S. EPA Tier 4f									
A	1950	(76,8)	1950	(76,8)	2000	(78,7)	1950	(76,8)	2000	(78,7)
D	850	(33,5)	850	(33,5)	850 / 812	(33,5 / 32,0)	850	(33,5)	850 / 812	(33,5 / 32,0)
G	330	(13,0)	330	(13,0)	330	(13,0)	330	(13,0)	330	(13,0)
G1	605	(23,8)	605	(23,8)	605	(23,8)	605	(23,8)	605	(23,8)
H	2840	(111,8)	2840	(111,8)	2840	(111,8)	2840	(111,8)	2840	(111,8)
H1	1995	(78,5)	1995	(78,5)	1995	(78,5)	1995	(78,5)	1995	(78,5)
H2	2400	(94,5)	2400	(94,5)	2400	(94,5)	2400	(94,5)	2400	(94,5)
H3	2150	(84,6)	2150	(84,6)	2150	(84,6)	2150	(84,6)	2150	(84,6)
L	2915	(114,8)	2915	(114,8)	2915	(114,8)	2915	(114,8)	2915	(114,8)
L1	3000	(118,1)	3000	(118,1)	3000	(118,1)	3000	(118,1)	3000	(118,1)
L2	2820	(111,0)	2820	(111,0)	2820	(111,0)	2820	(111,0)	2820	(111,0)
W	1300	(51,2)	1300	(51,2)	1300 / 1275	(51,2 / 50,2)	1380	(54,3)	1380 / 1275	(54,3 / 50,2)
W1	1385	(54,5)	1385	(54,5)	1460	(57,5)	1460	(57,5)	1460	(57,5)
X	40	(1,6)	40	(1,6)	-	-	40	(1,6)	-	-
T	18	(0,7)	18	(0,7)	18	(0,7)	18	(0,7)	18	(0,7)

1.3 Technical data

		ARX 36-2	ARX 40-2	ARX 40-2C	ARX 45-2	ARX 45-2C
		EU Stage V / U.S. EPA Tier 4f				
Weight						
Operating weight of EN 500-1+A1 (CECE)	kg (lb)	3785 (8340)	4200 (9260)	4055 (8940)	4395 (9690)	4185 (9230)
Operating load of EN 500-1+A1 (CECE) on front axis	kg (lb)	1815 (4000)	2010 (4430)	2130 (4700)	2115 (4660)	2235 (4930)
Operating load of EN 500-1+A1 (CECE) on rear axis	kg (lb)	1970 (4340)	2190 (4830)	1925 (4240)	2280 (5030)	1950 (4300)
Weight of half fluid capacities	kg (lb)	195 (430)	195 (430)	205 (450)	195 (430)	205 (450)
Operating weight of ISO 6016	kg (lb)	3810 (8400)	4225 (9310)	4080 (8990)	4420 (9740)	4210 (9280)
Maximum weight with accessories	kg (lb)	4075 (8980)	4490 (9900)	4355 (9600)	4685 (10330)	4485 (9890)
Maximum permitted weight according to ROPS	kg (lb)	5100 (11240)	5100 (11240)	5100 (11240)	5100 (11240)	5100 (11240)
Static linear load of front drum	kg/cm (lb/in)	14,1 (30)	15,6 (30)	16,5 (40)	15,4 (30)	16,3 (40)
Static linear load of rear drum	kg/cm (lb/in)	16,5 (40)	18,2 (40)	-	17,8 (40)	-
Weight of Canopy	kg (lb)	35 (80)	35 (80)	35 (80)	35 (80)	35 (80)
Weight of Ammann edge cutter	kg (lb)	60 (130)	60 (130)	60 (130)	60 (130)	60 (130)
Driving characteristics						
Maximum transport speed	km/h (MPH)	10 (6,2)	10 (6,2)	10 (6,2)	10 (6,2)	10 (6,2)
Climbing ability without vibration	%	40	40	40	40	40
Climbing ability with vibration	%	30	30	30	30	30
Lateral static stability	%	70	70	70	70	70
Lateral stability during driving without vibration	%	25	25	25	25	25
Lateral stability during driving with vibration	%	15	15	15	15	15
Turning radius inner (edge)	mm (in)	2720 (107,1)	2720 (107,1)	2720 (107,1)	2670 (105,1)	2670 (105,1)
Turning radius outer (contour)	mm (in)	4300 (169,3)	4300 (169,3)	4300 (169,3)	4300 (169,3)	4300 (169,3)
Type of drive	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
Number of driving axles	-	2	2	2	2	2
Oscillation angle	°	9	9	9	9	9
Angle of steering	°	35	35	35	35	35
Steering						
Type of steering	-	Joint	Joint	Joint	Joint	Joint
Steering control	-	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic
Linear hydraulic motors	-	1	1	1	1	1

		ARX 36-2	ARX 40-2	ARX 40-2C	ARX 45-2	ARX 45-2C
		EU Stage V / U.S. EPA Tier 4f				
Engine						
Manufacturer	-	Kubota	Kubota	Kubota	Kubota	Kubota
Type	-	D1803-CR-TE5B	D1803-CR-TE5B	D1803-CR-TE5B	D1803-CR-TE5B	D1803-CR-TE5B
Power according to SAE J1995	kW	32,8	32,8	32,8	32,8	32,8
Number of cylinders	-	3	3	3	3	3
Cylinder capacity	cm^3 (cu in)	1826 (111)	1826 (111)	1826 (111)	1826 (111)	1826 (111)
Nominal speed	min^{-1} (RPM)	2400	2400	2400	2400	2400
Maximum torque	Nm (ft lb)/rpm	150,5 / 1500	150,5 / 1500	150,5 / 1500	150,5 / 1500	150,5 / 1500
Average fuel consumption	l/h (gal US/h)	3,6 (1)	3,6 (1)	3,6 (1)	3,6 (1)	3,6 (1)
Engines complies with emission regulations	-	EU Stage V, U.S. EPA Tier 4 Final	EU Stage V, U.S. EPA Tier 4 Final	EU Stage V, U.S. EPA Tier 4 Final	EU Stage V, U.S. EPA Tier 4 Final	EU Stage V, U.S. EPA Tier 4 Final
Cooling system of engine	-	Liquid	Liquid	Liquid	Liquid	Liquid
Brakes						
Operating	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
Parking	-	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc
Emergency	-	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc	Mechanical multiple-disc
Vibration						
Frequency I	Hz (VPM)	41 (2460)	41 (2460)	41 (2460)	41 (2460)	41 (2460)
Frequency II	Hz (VPM)	55 (3300)	55 (3300)	55 (3300)	55 (3300)	55 (3300)
Amplitude I	mm (in)	0,6 (0,024)	0,6 (0,024)	0,6 (0,024)	0,6 (0,024)	0,6 (0,024)
Amplitude II	mm (in)	0,4 (0,016)	0,4 (0,016)	0,4 (0,016)	0,4 (0,016)	0,4 (0,016)
Centrifugal force I	kN	39,3	42,4	42,4	45	45
Centrifugal force I High eccentricity	kN	50,7	53,8	53,8	56,4	56,4
Centrifugal force II	kN	51,9	55	55	57,6	57,6
Type of drive	-	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic	Hydrostatic
Watering						
Type of watering	-	Pressure	Pressure	Pressure	Pressure	Pressure
Number of pumps	-	1	1	2	1	2
Number of filtrations	-	2	2	2	2	2
Fluid capacities						
Fuel	l (gal US)	57 (15,1)	57 (15,1)	57 (15,1)	57 (15,1)	57 (15,1)
Water for drum watering	l (gal US)	340 (89,8)	340 (89,8)	340 (89,8)	340 (89,8)	340 (89,8)
Engine (oil filling)	l (gal US)	7 (1,8)	7 (1,8)	7 (1,8)	6,8 (1,8)	7 (1,8)
Cooling system	l (gal US)	7,3 (1,9)	7,3 (1,9)	7,3 (1,9)	6,7 (1,8)	7,3 (1,9)
Hydraulic system	l (gal US)	53,5 (14,1)	53,5 (14,1)	53,5 (14,1)	53,5 (14,1)	53,5 (14,1)
Spraying emulsion	l (gal US)	-	-	18 (4,8)	-	18 (4,8)

1.3 Technical data

		ARX 36-2	ARX 40-2	ARX 40-2C	ARX 45-2	ARX 45-2C
		EU Stage V / U.S. EPA Tier 4f				
Wiring						
Voltage	V	12	12	12	12	12
Battery capacity	Ah	77	77	77	77	77
Noise and vibration emissions						
Measured sound pressure level A, L_{pA} at the operator's position (platform) *	dB	82	82	82	82	82
Uncertainty K_{pA} *	dB	2	2	2	2	2
Guaranteed sound power level A, L_{WA} **	dB	101	101	101	101	101
Declared highest weighted effective value of vibration acceleration transmitted to the whole body (platform) ***	m/s^2 (ft/s^2)	<0,5 (<1,6)	<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 (platform) ***	m/s^2 (ft/s^2)	<2,5 (<8,2)	<2,5 (<8,2)	<2,5 (<8,2)	<2,5 (<8,2)	<2,5 (<8,2)
Optional equipment						
Additional lights						
Direction lights						
Working lights						
Beacon						
Back signal horn						
Licence plate holder						
One-point lifting lug						
Battery disconnector						
2nd travel control lever						
Arm rest						
Water tank lock						
Infra thermometer						
ACE Force						
ATC inter-axle lock						
Edge cutter						
Fixed scrapers						
Hinged scrapers						
Set of filters, 500 h						
Canopy						
Seat heating						
Special colour design						
Additional documentation set						
Certificate of Origin						
Audible brake warning						
Rear-view mirrors						
Telematic						
Green LED beacon						

* 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

2 OPERATING MANUAL

ARX 36-2
ARX 40-2
ARX 45-2
(Kubota 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 operators and maintenance workers that include requirements to provide for safe operation of the machine.
- Before the compacting works are started, he must verify:
- utility lines
- underground areas (direction, depth)
- seepage or sudden escape of harmful substances
- ground-bearing capacity, travel plane slope
- other obstacles and specify work safety measures.
- He must make the machine operator carrying out the earth works familiar with the above items.
- He must specify a technological procedure including a working process for the specific job that specifies among others:
- measures for works under extraordinary conditions (works within protection zones, extreme slopes, etc.)
- precautions for any natural disaster hazards
- work performance requirements and observance of principles of health and safety at work
- technical and organizational measures to ensure safety of employees, workplaces and surroundings.
- He must make the machine operators provably familiar with the technological procedure.

2.1.1.2 Work in the dangerous area

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

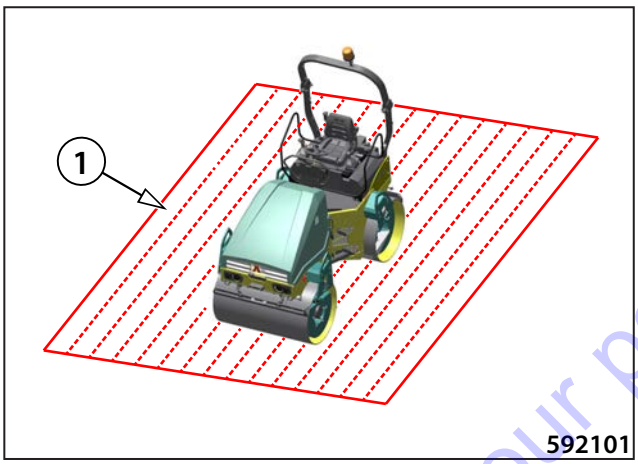
The worker is not allowed to work alone in a workplace where another worker is not in sight and within an ear shot who if necessary will be able to provide help or call for help unless another effective form of supervision or communication is ensured.

2.1.1.3 Danger zone of the machine and safe distance

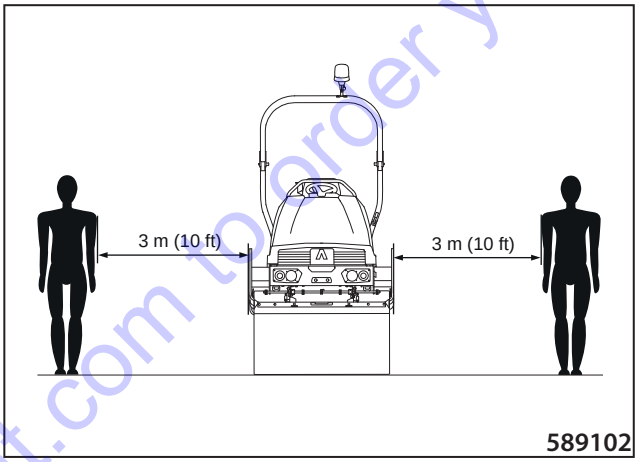
Danger zone of a stationary machine:

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!

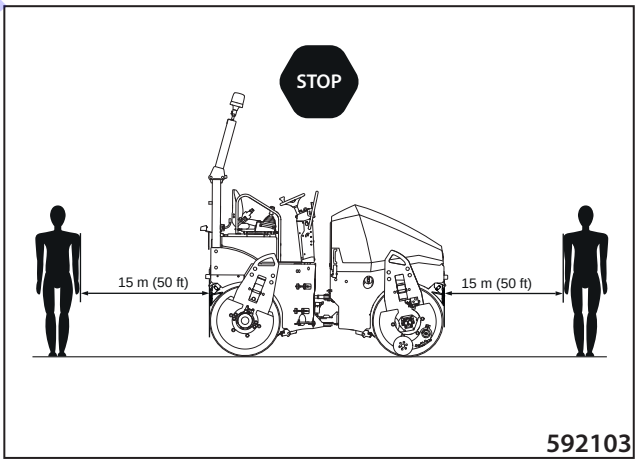
Only professionally qualified, instructed and trained personnel designated to operate and maintain the machine may enter the danger zone of the machine!

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.

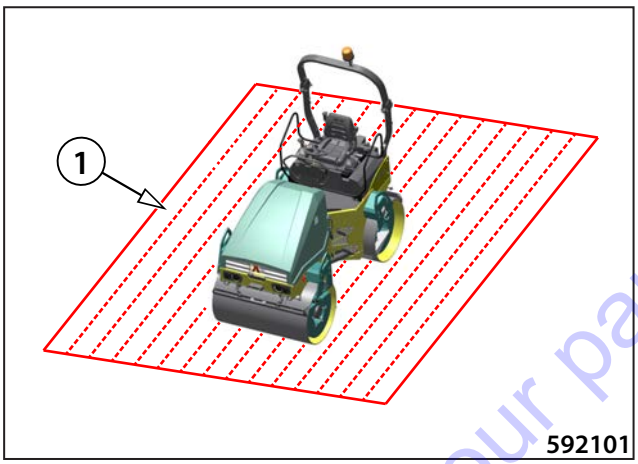
These requirements during machine operation are considered mandatory with regard to the safety of persons!

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!

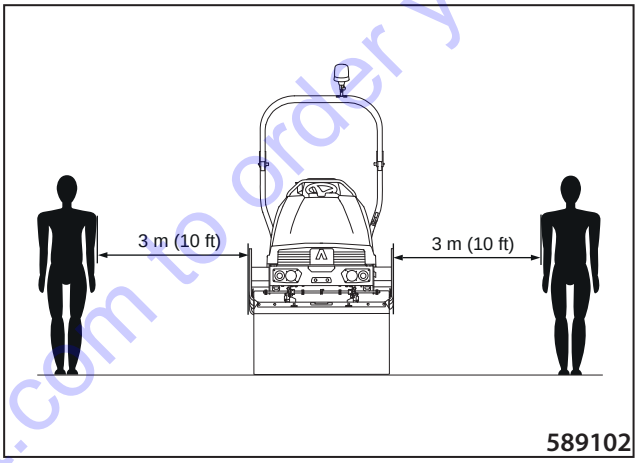


Danger zone of a moving machine:

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 20 m in front and rear of the direction of travel of the machine!

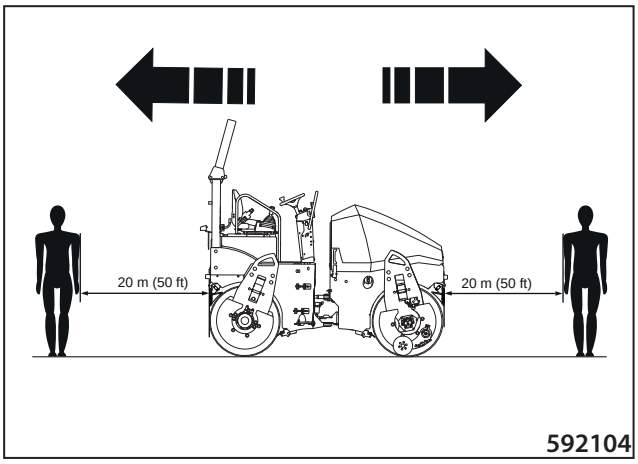
No persons may be present in the danger zone of the machine when the machine is moving!

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.

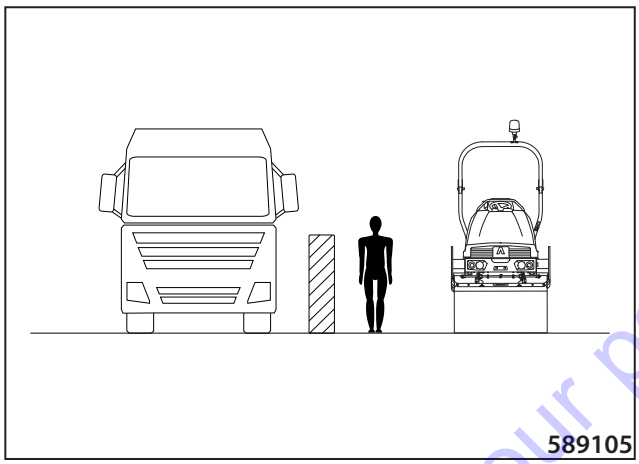
These requirements during machine operation are considered mandatory with regard to the safety of persons!

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!



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!

2.1.1.3 Ensurance of safety measures by the provider

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

2.1.1.4 Protective frame ROPS

When the protection frame ROPS is used:

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

2.1.2 Requirements for the qualification of machine operators

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

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

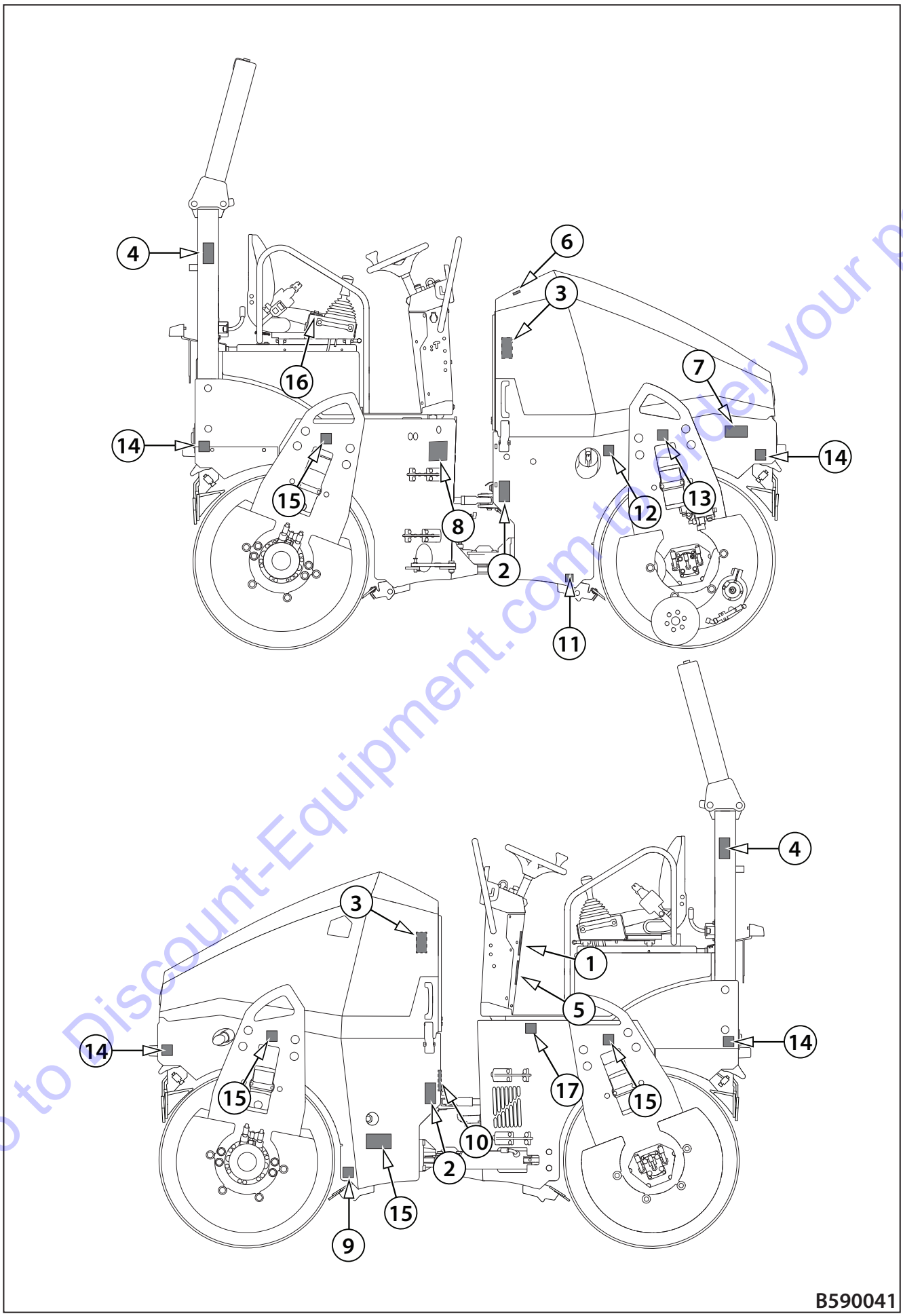
2.1.4 Forbidden activities – safety and guarantee

The following is forbidden

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

- Filling the hydraulic circuit during the guarantee period in a different way than using the hydraulic unit.
- Working long-term in the vibro stroke mode!
- Operating the machine with the regeneration switch in the OFF position. The diesel particulate filter (DPF) can be destroyed.
- 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 Read the operating manual
Hearing protection
Washing the machine with water
Keep calm and adjust

4338

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

Hearing protection - Dangerous noise level! Use hearing protection.

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

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

2 Pinch points

3865

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

3 Risk of injury

3866

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

4 Risk of injury

3864bz

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

5 Using the parking and emergency brakes

3867bz

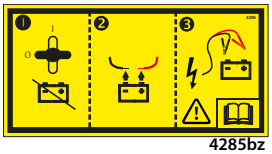
Use the parking brake only when the machine is stopped. Use the emergency brake only for stopping the machine in emergency.

6 Safety belt

3863bz

Fasten the safety belt before the machine starts moving.

7 Charging the battery



4285bz

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

8 Guaranteed sound power level

3038

9 Hydraulic oil drain plug

3960

10 Engine oil drain plug

3212

11 Fuel drain plug

12 Fuelling

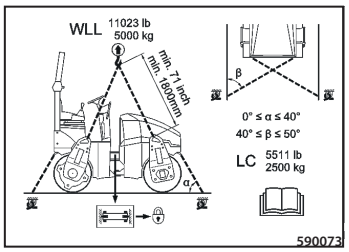
13 Suspension hole

When lifting, suspend the machine only in these holes.

14 Fastening hole

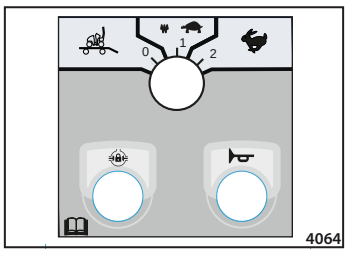
When transporting, fasten the machine only in these holes.

15 Suspension diagram



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

16 Travel mode switch



17 Emulsion sprinkling tank

2.1.6 Manual signals

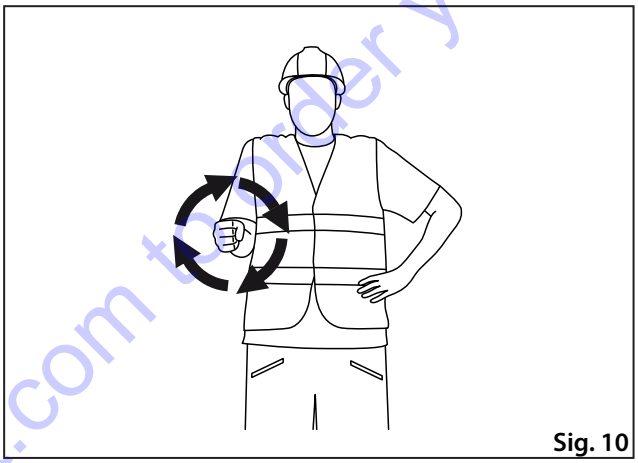
Signals given by an assistant operator if the operator cannot see the travelling or working area or work devices of the machine.

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.

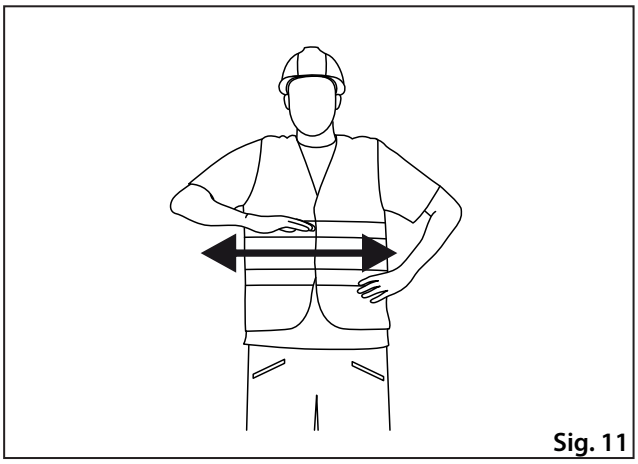
SIGNALS FOR GENERAL COMMANDS

Engine start



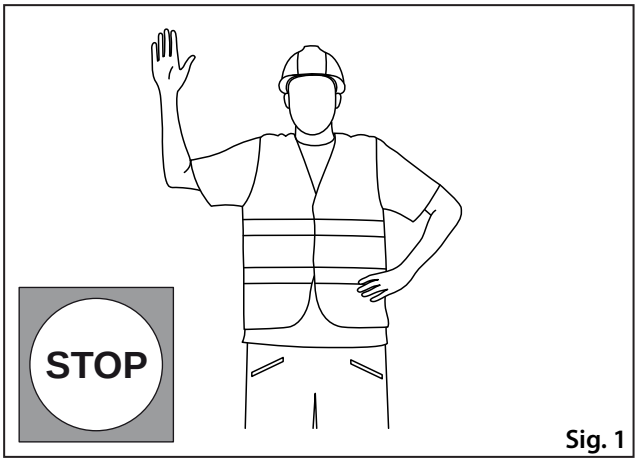
Sig. 10

Engine OFF



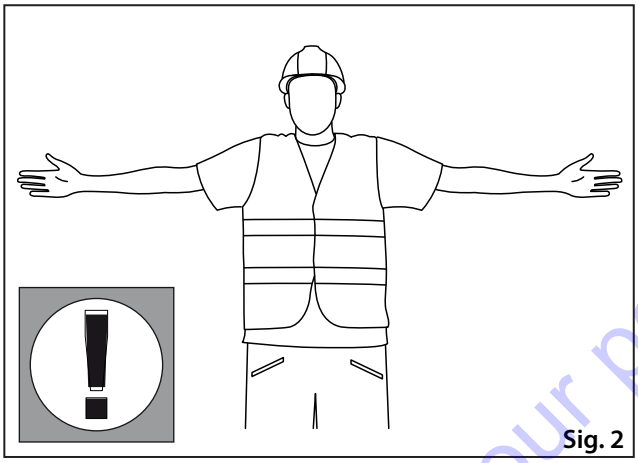
Sig. 11

Stop



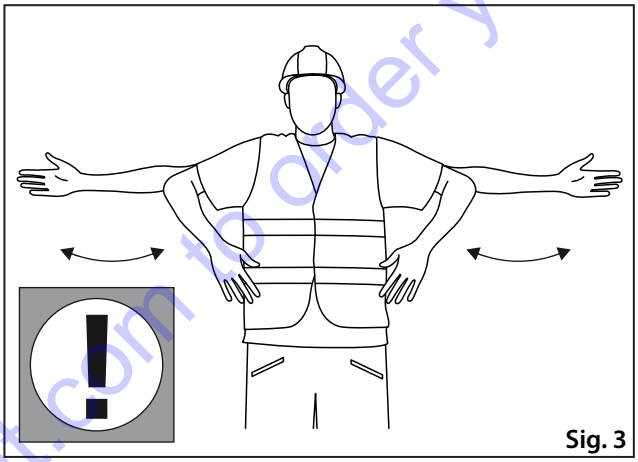
Sig. 1

Watch out!



Sig. 2

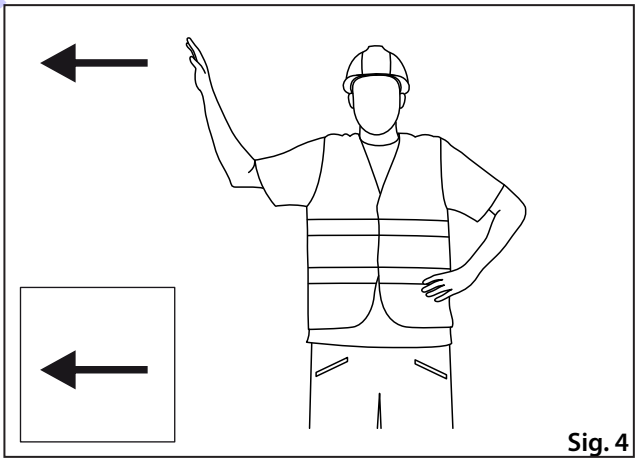
Watch out, danger!



Sig. 3

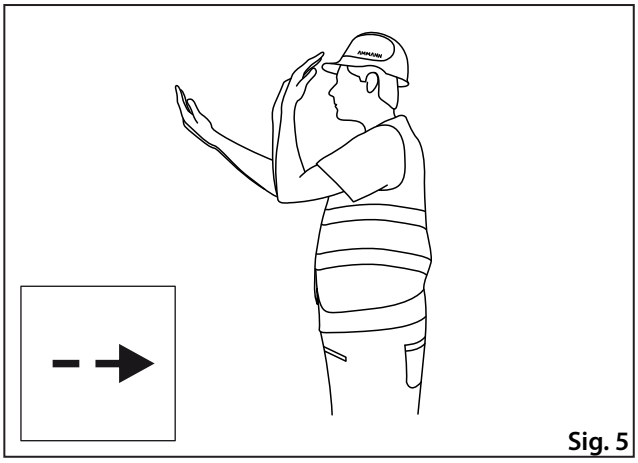
SIGNALS FOR DRIVE

Travel



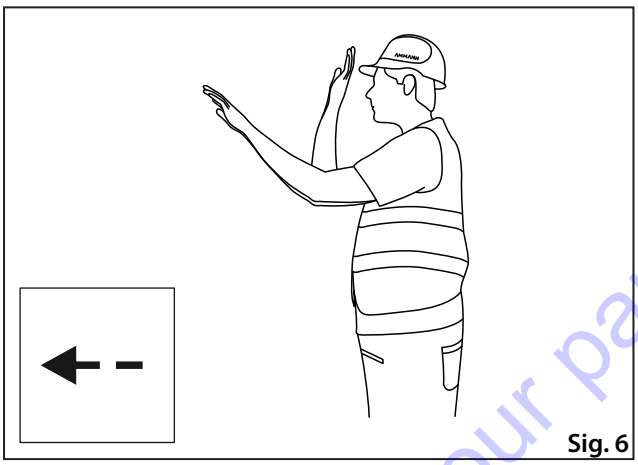
Sig. 4

Slow forward drive – towards me



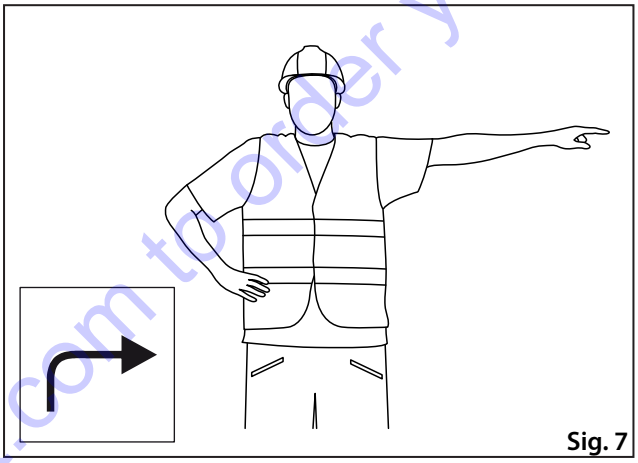
Sig. 5

Slow backward drive – away from me



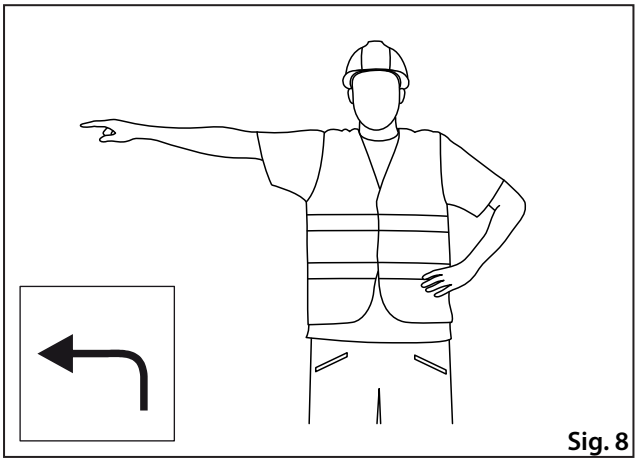
Sig. 6

Drive to the right



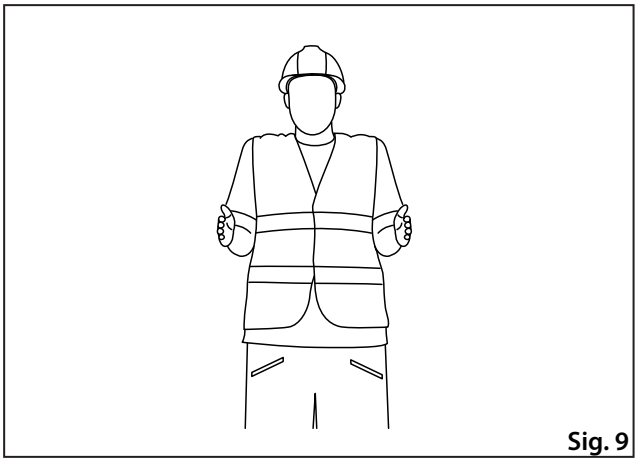
Sig. 7

Drive to the left



Sig. 8

Short distance travel



Sig. 9

2.2 Environmental and hygiene principles

2.2.1 Hygiene principles

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

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

2.2.2 Environmental principles

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

  This category of waste products includes in particular:

  - organic and synthetic lubricating materials, oils and fuels;
  - coolants;
  - battery cartridges and batteries;
  - 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 applicable to environmental and health protection.

2.3 Preservation and storage

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

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

In addition:

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

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

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

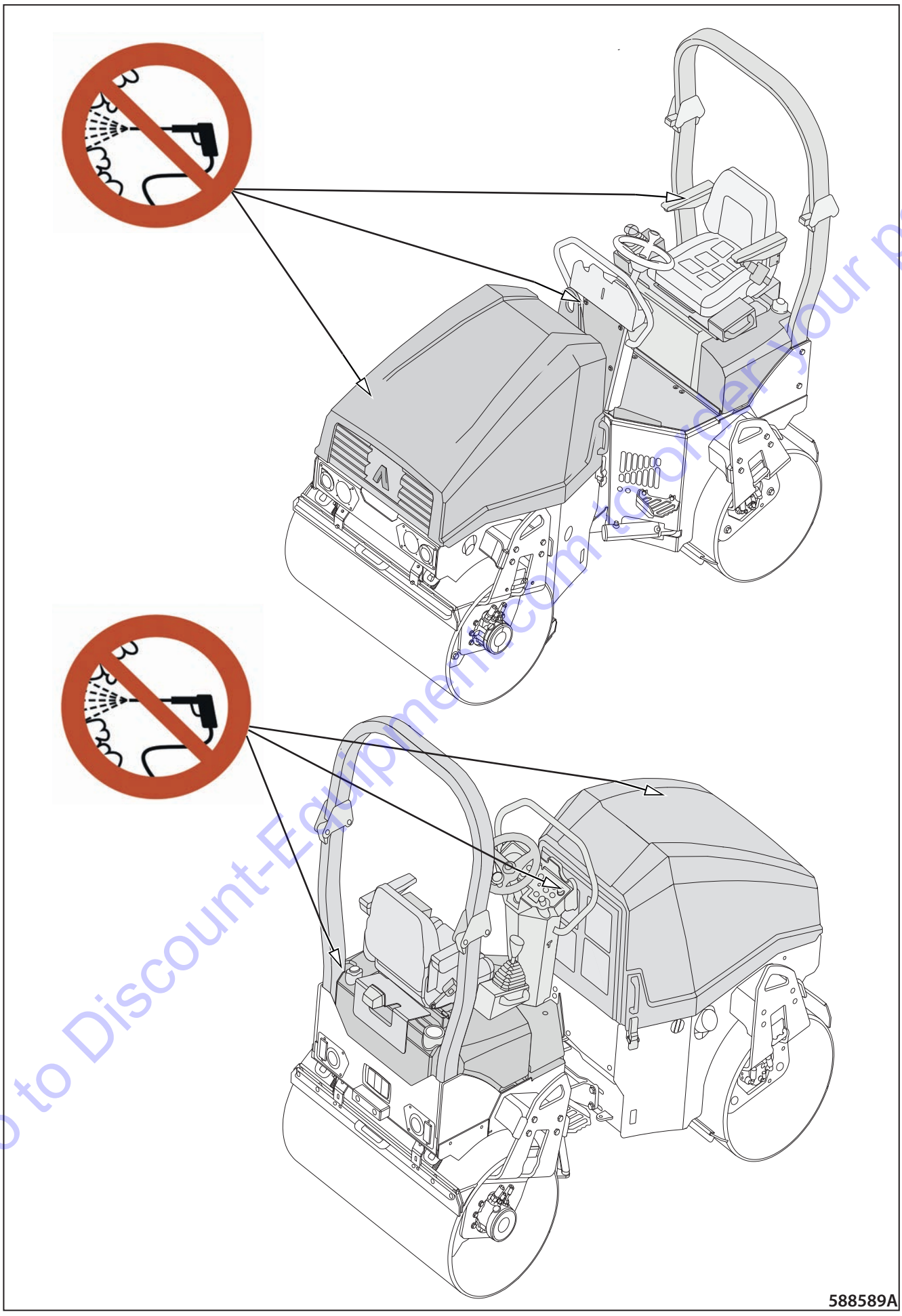
In addition it is recommended to:

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

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

Never start the engine during storage!

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



2.3.3 Machine depreservation

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

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

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

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

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

- Remove the preservation according to the manufacturer's manual.

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

2.4 Machine disposal after its service life

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

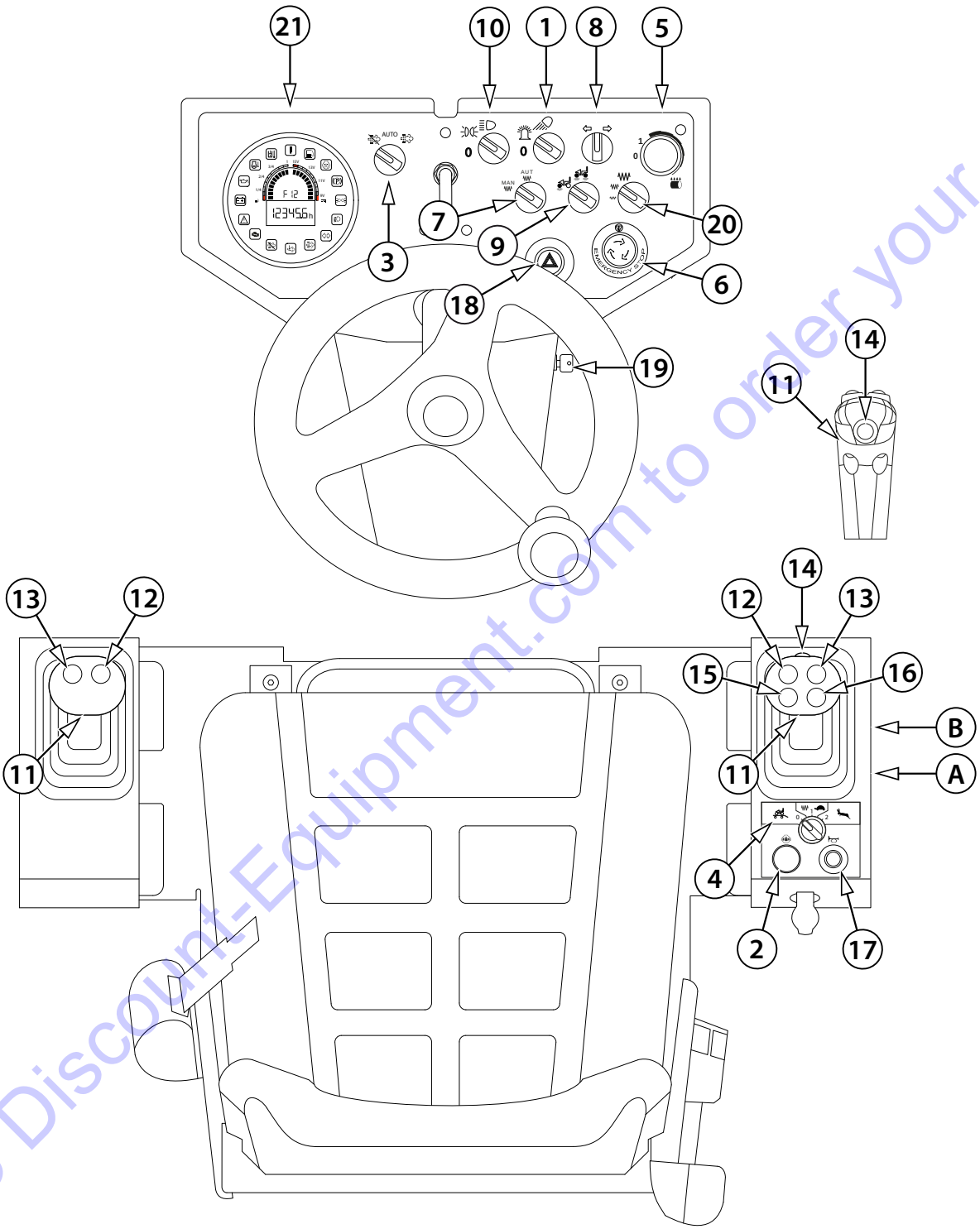
- specialized companies with a respective authorization for such operations
- the machine manufacturer or accredited contracting service organizations authorized by the manufacturer.

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

590050B

Legend:

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

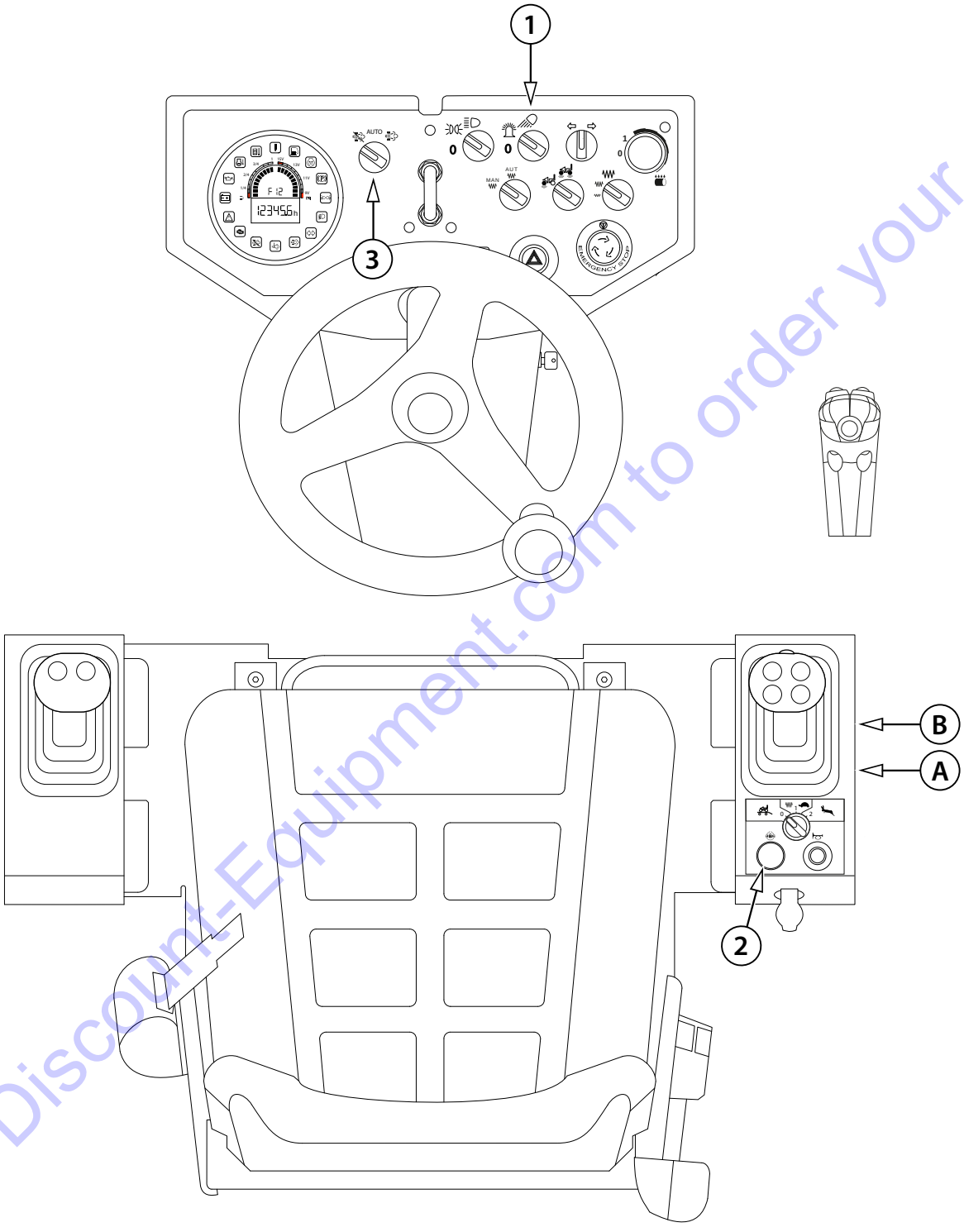


590057C

2.6.1 Dashboard and control panels

Legend:

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



Brake test button (A)

Used to check the correct brake function.

Calibration button (B)

Used to calibrate functions:

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


AMN138

Beacon and rear light change-over switch (1)

- To the gear 1: The beacon is ON.
- To the gear 2: The rear light is ON.

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


AMN45

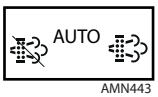
Differential lock button (2)

It is used for turning on the differential lock.

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

The differential lock is used for improving surface adhesion of the tyres, stability and controllability.

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



AMN443

Regeneration switch (3)

It is used to activate DPF regeneration.

Left position – regeneration OFF

- It is used to interrupt regeneration in emergency situations only, such as machine operation in an explosive or flammable environment.
- Do not suppress regeneration unless is it absolutely necessary.

Repeated suppression of regeneration results in DPF damage. Prolonged operation of the machine with suppressed regeneration will destroy the diesel particulate filter (DPF).

Centre position – AUTO

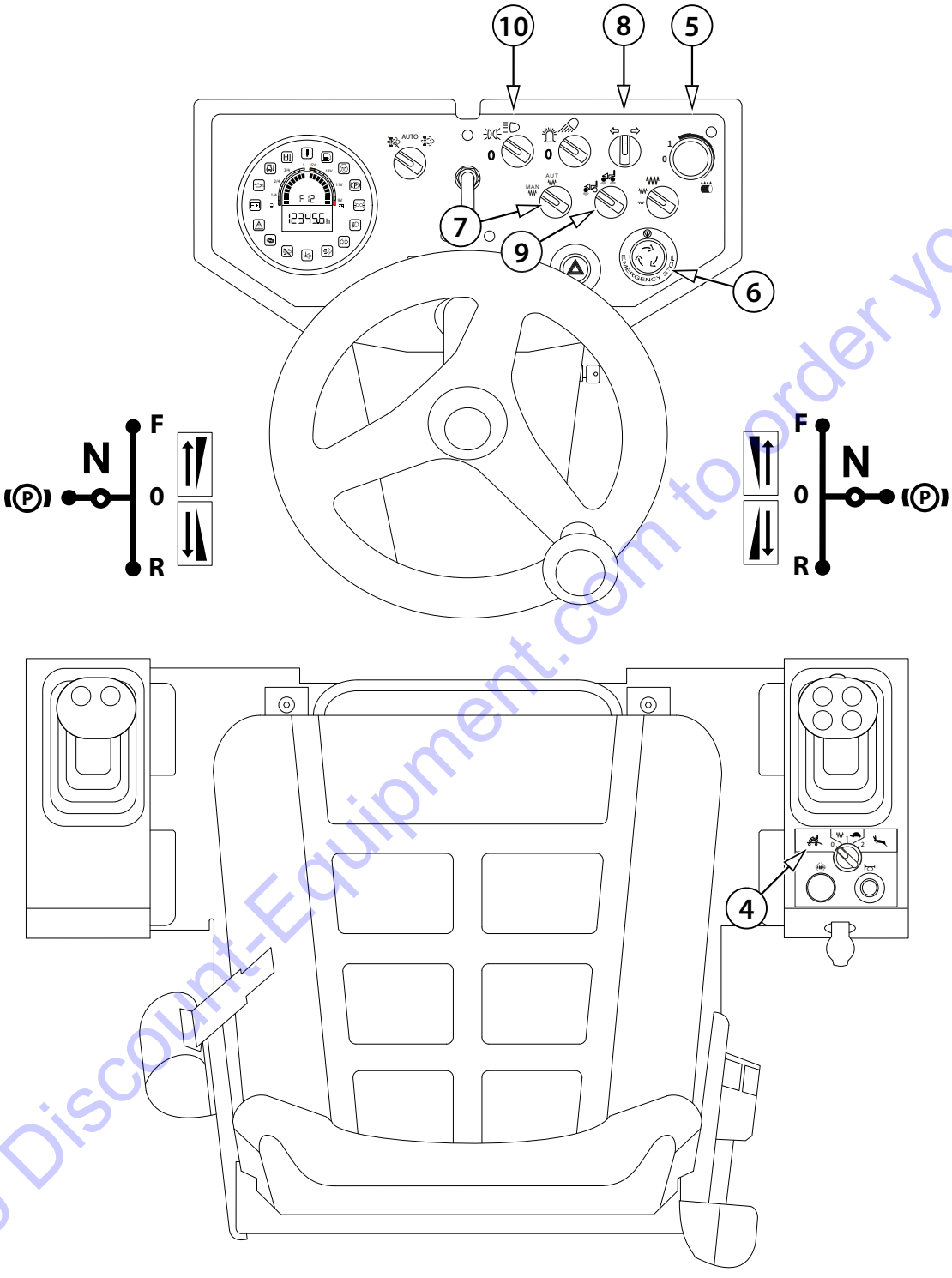
- Active regeneration is automatic without operator input (according to Chapter 2.7.14.2.2).

Leave the AUTO position set for the whole duration of machine operation. This will prevent diesel particulate filter (DPF) damage.

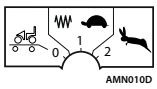
Right position – parking active regeneration ON

- It is used to activate parking active regeneration.

Perform DPF regeneration according to Chapter 2.7.14 Principles of use of the machine with a diesel particulate filter (DPF).



590059C



AMN010D

Travel mode switch (4)

Loading mode (0)

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

Working mode (1)

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

Transport mode (2)

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


AMN83

Sprinkling potentiometer (5)

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

AMN142

Emergency brake button (6)

Pressing the button activates the emergency brake of the machine. The machine stops, the engine shuts down. After activating the emergency brake button the indicator lamps for battery charging (23), engine lubrication (24), parking brake (30) and emergency stop (27) are shown on the display.

3726G

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

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

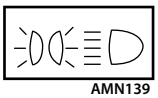

3726CH

Direction lights switch (8)


AMN441

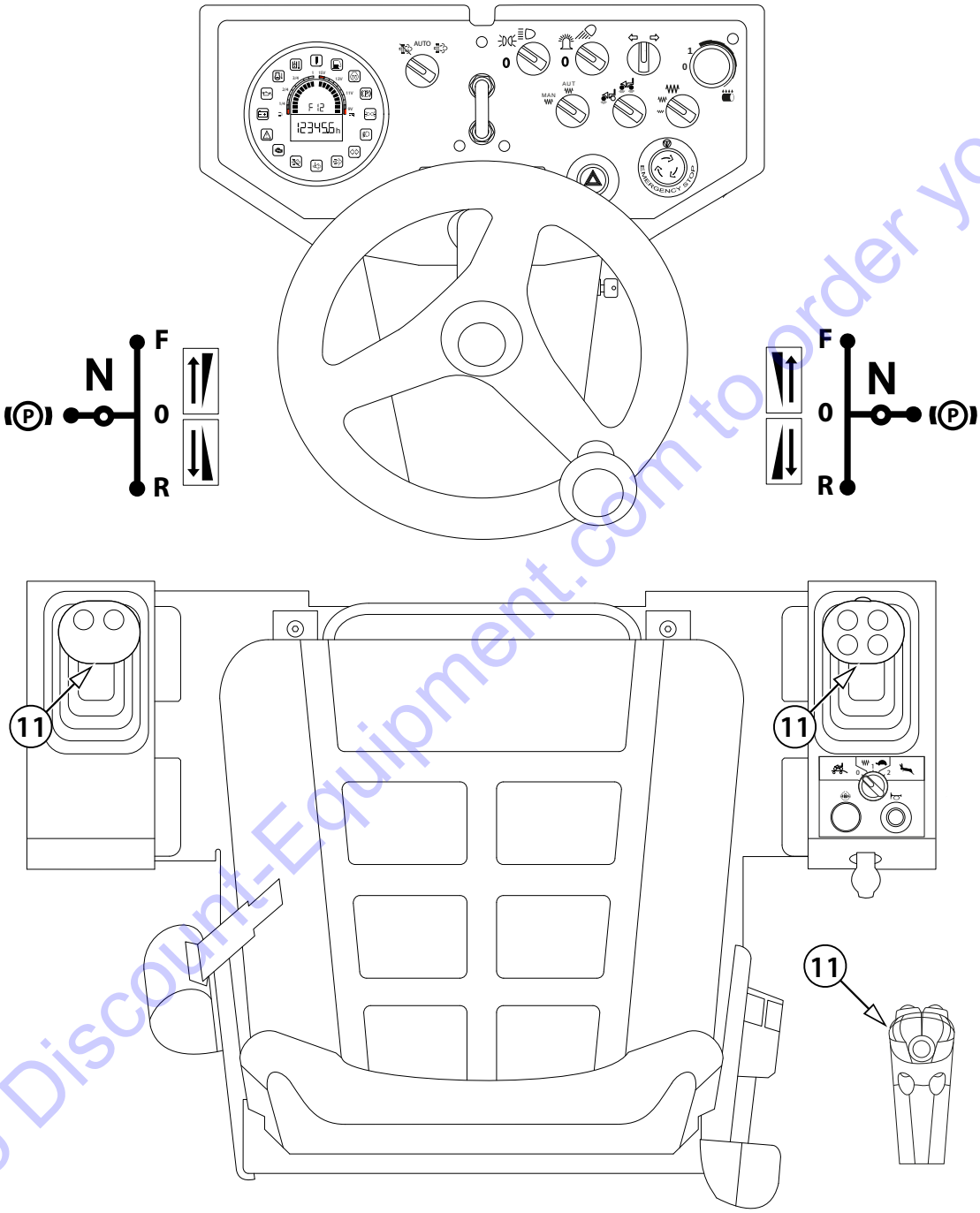
Vibrating drum selector switch (9)

- front drum
- front and rear drum


AMN139

Lights switch (outline lights / front lights) (10)

- outline lights
- front lights



590059C2

Travel control – right (standard) (11)

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

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

Shifting the control to the neutral position (N) stops the machine.

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

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

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

- P – parking brake – activated parking brake, idle engine speed
- N – neutral – the machine is not braked, idle engine speed
- 0 – zero position – working engine speed
- F – forward travel – working engine speed
- R – reverse travel – working engine speed

Travel control – left (optional)

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

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

Shifting the control to the neutral position (N) stops the machine.

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

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

The travel control is fitted with vibration and drum sprinkling.

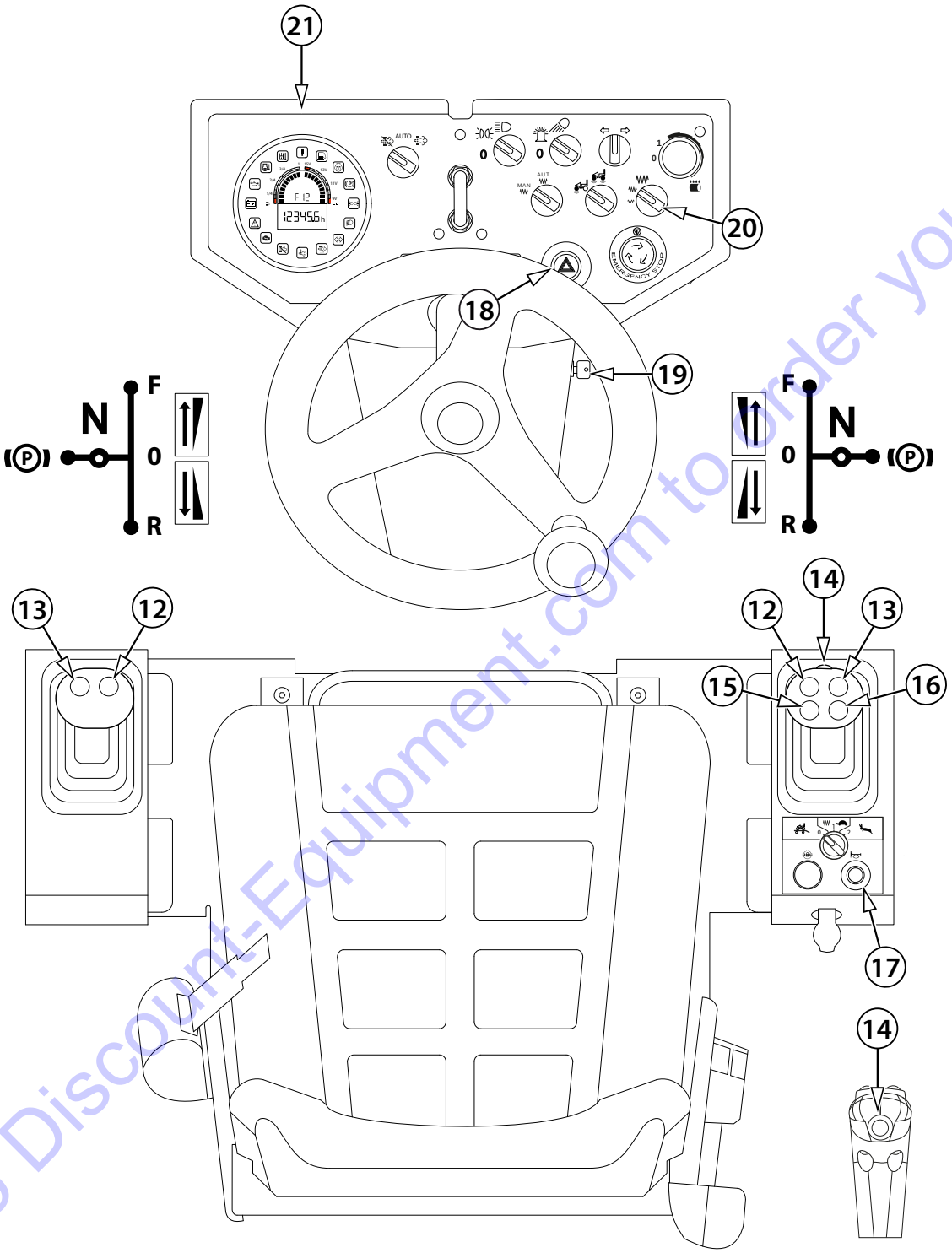
- P – parking brake – activated parking brake, idle engine speed
- N – neutral – the machine is not braked, idle engine speed
- 0 – zero position – working engine speed
- F – forward travel – working engine speed
- R – reverse travel – working engine speed

Note

The machine can be operated with only one travel control.

If requested by the customer, the machine can be equipped with the second travel control (11) placed on the left armrest.

For the machine travel using one of the controls (the active one), the inactive control must be set to the zero position (0). If the inactive control is deflected from the zero position, the machine will stop. When the machine is stopped, move both of the travel controls (11) to the zero position and then select the driving direction.



Vibration switch (12)

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

Sprinkling switch (13)

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

Edge cutter sprinkling switch (14)

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

Edge cutter button – up (15)

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

Edge cutter button – down (16)

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

Warning horn button (17)

Warning lights switch (18)

Ignition box (19)

0 - OFF

I - Engine glowing

II - Not assigned

III - Engine starting

Vibration amplitude switch (20)

low frequency – high amplitude

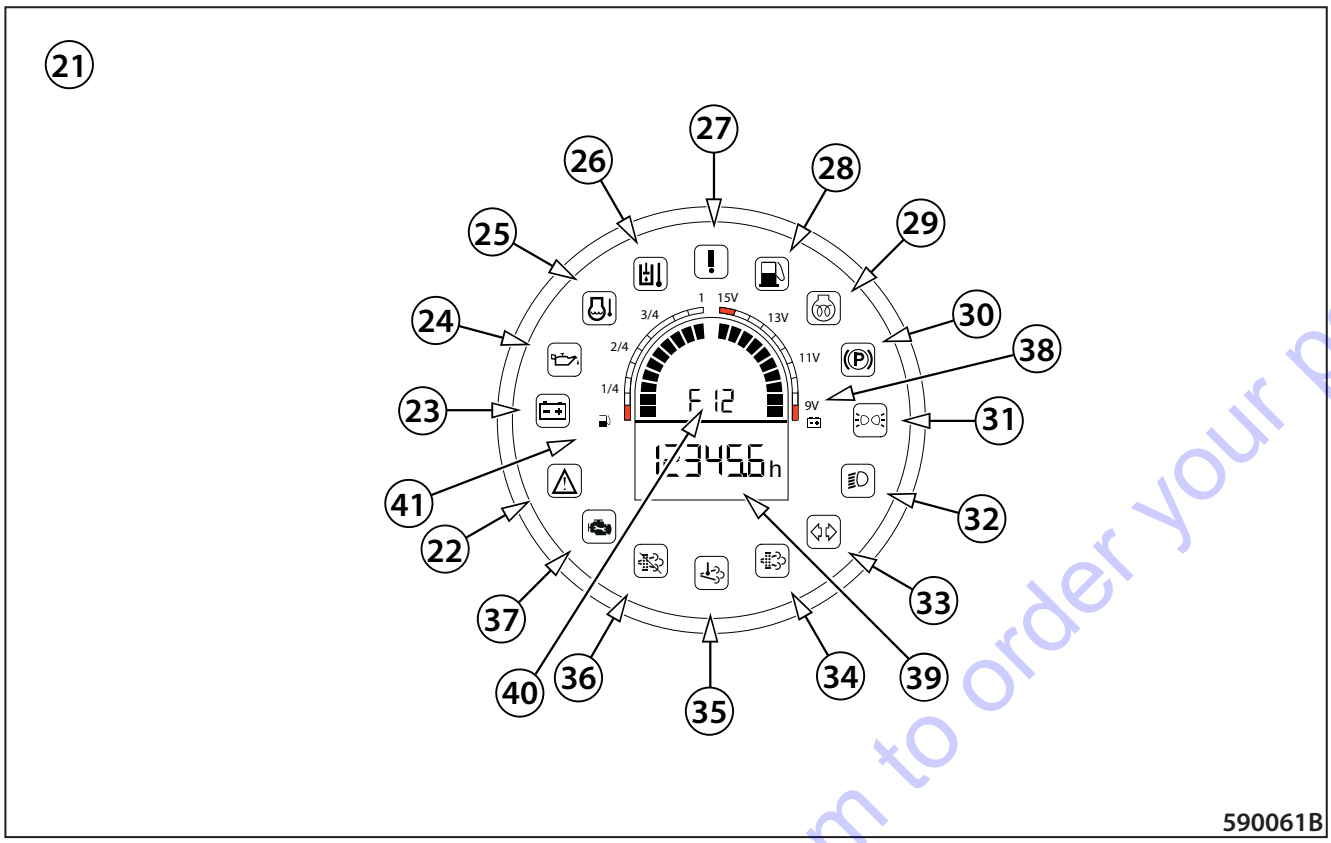
low frequency – low amplitude

high frequency – low amplitude

Before changing vibration parameters (amplitude, frequency), stop the vibration.

It is forbidden to vibrate on the spot.

It is prohibited to change vibration parameters which the machine is vibrating.



Display (21)

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

Indicator lamps

22 - Error message indicator lamp
23 - Battery charging indicator lamp
24 - Engine oil pressure indicator lamp
25 - Coolant temperature indicator lamp
26 - Hydraulic oil temperature indicator lamp
27 - Emergency stop indicator lamp
28 - Fuel reserve indicator lamp
29 - Engine glowing indicator lamp
30 - Brake indicator lamp
31 - Outline lights indicator lamp
32 - Dipped lights indicator lamp
33 - Direction light indicator lamp
34 - DPF clogging indicator lamp
35 - Indicator lamp of high temperature of exhaust gases
36 - Suppression of DPF regeneration indicator lamp
37 - Engine failure indicator lamp
38 - Battery voltage indicator
39 - Counter of worked engine hours
40 - Error message indicator
41 - Fuel tank indicator

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


AMN58

Error message indicator lamp (22)

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

- Check the machine according to the table of error message codes.
- If the indicator lamp remains lighting, call the service!
- See Annex 3.8 – Error codes.


2777

Battery charging indicator lamp (23)

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

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


AMN49

Engine lubrication indicator lamp (24)

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

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


AMN76

Engine overheating indicator lamp (25)

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


2635

Hydraulic oil temperature indicator lamp (26)

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

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


592520

Emergency stop indicator lamp (27)

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

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

The engine can be started after the failure has been repaired and the emergency brake disabled!


595425

Fuel indicator lamp (28)

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

Refill the fuel!


3518

Engine heating indicator lamp (29)

It indicates the engine warming up before the cold start. The heating duration is 15 sec.

Start the engine after the indicator lamp has gone out!


2703

Parking brake indicator lamp (30)

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


AMN146

Outline lights indicator lamp (31)

The indicator lamp indicates that the outline lights are ON.


596303

Front lights indicator lamp (32)

The indicator lamp indicates that the front lights are ON.


595200

Direction light indicator lamp (33)

The indicator lamp indicates that the directions lights are ON.


AMN118

Indicator lamp of DPF (Diesel Particulate Filter) clogging (34)

The indicator lamp signals the requirement to regenerate DPF and the course of regeneration.

If the indicator lamp is on, proceed according to Chapter 2.7.14 Principles of use of the machine with a diesel particulate filter (DPF).


AMN120

Indicator lamp of high temperature of exhaust gases (35)

The indicator lamp signals the DPF (Diesel particulate filter) regeneration in progress.

If the indicator lamp is on, proceed according to Chapter 2.7.14 Principles of use of the machine with a diesel particulate filter (DPF).


AMN442

Indicator lamp of DPF (diesel particulate filter) regeneration suppression (36)

The indicator lamp signals blocked start of DPF regeneration.

Prolonged operation of the machine with suppressed regeneration is prohibited. Check that the DPF regeneration switch is in the left position. Set the regeneration switch to the AUTO position – the DPF regeneration indicator lamp goes off.

Repeated suppression of regeneration results in diesel particulate filter (DPF) damage. Prolonged operation of the machine with suppressed regeneration will destroy the diesel particulate filter (DPF).


AMN47

Engine failure indicator lamp (37)

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!


2777

Battery voltage indicator (38)


AMN26

Worked hours indicator (39)

AMNF12

Error message code indicator (40)


595425

Fuel level indicator (41)

Seat

Seat adjustment

1 Backrest inclination adjustment

2 Seat springing stiffness

3 Longitudinal seat travel

4 Cross seat travel

Seat springing stiffness

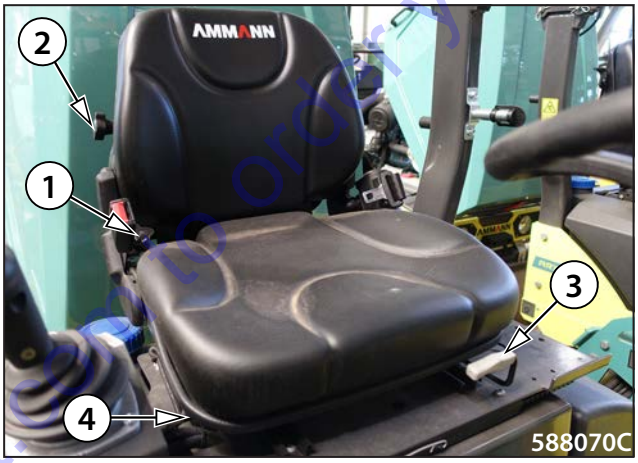
Turn the switch (2) to set stiffness according to driver's weight between 50 and 120 kg (110 - 265 lb).

Adjust the seat before driving the machine.

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

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

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



Longitudinal seat travel

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

Seat cross travel

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

Seat switch

The seat switch is located in the seat cushion.

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

These restrictions vary depending on:

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

Engine start blocking

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

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

Movement blocking

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

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

Machine stop

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

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

Engine shutdown

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

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

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

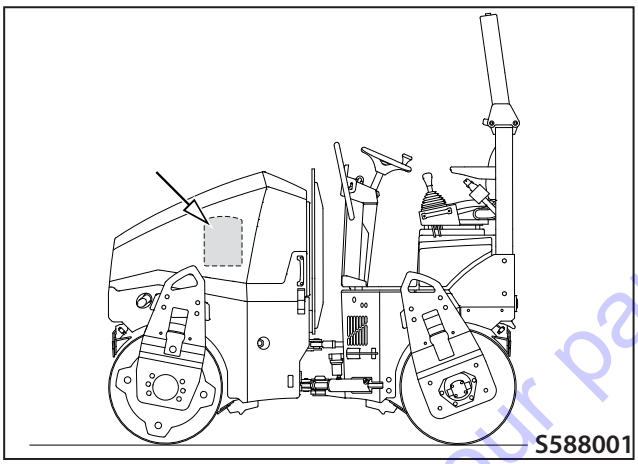
When operating the machine, the driver must follow the safety regulations and not carry out any activity that might endanger the safety of work; the driver must fully focus on steering the machine.

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

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

Document box

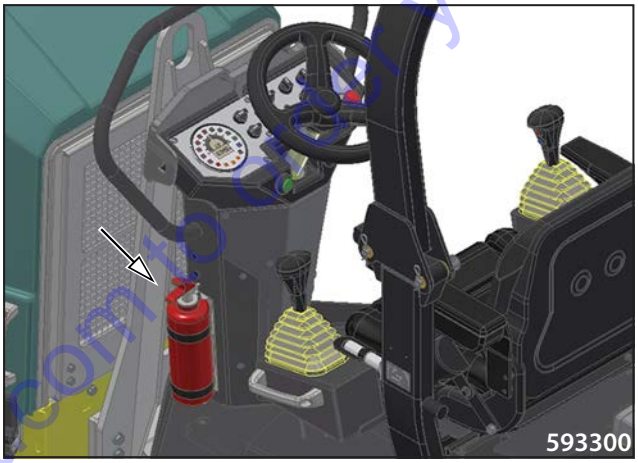
The storage box situated on the inner left side of the bonnet is used to store the Operating Manual and other documents related to the operation of the machine.



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

Fire extinguisher

Place to install a fire extinguisher.



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

Fuse box

F1 – 7.5 A .....Parking lights

F2 – 7.5 A .....Tail lights, licence plate light

F3 – 15 A .....Headlamps

F4 – 15 A .....Rear light, ROPS lights, beacon, green beacon, monitoring device

F5 – 5 A.....Direction indicators

F6 – 5 A.....Control unit – electronics

F7 – 40 A .....Control unit – power part

F8 – 5 A.....Display, alternator excitation

F9 – 25 A .....Hydraulic oil cooler

F10 – 10 A.....Service socket, seat heating

F11 - 7.5 A (15 A*) Water sprinkling pump, emulsion sprinkling pump at the axle

F12 – 7.5 A.....Right travel lever, left travel lever, differential lock switch, working mode selector, horn switch, brake tester, calibration button

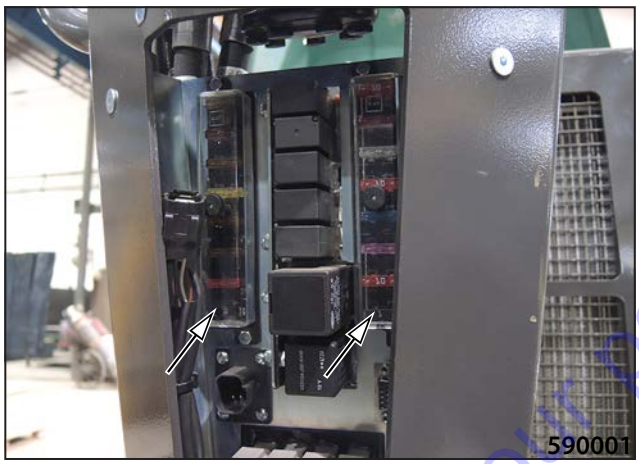
F13 – 7.5 A.....Horn

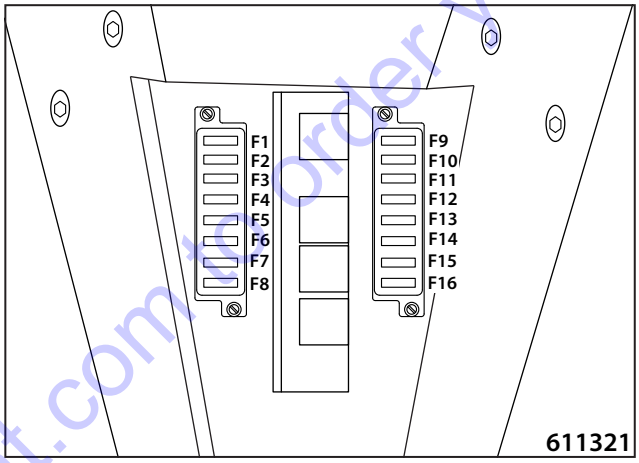
F14 – 5 A .....Seat switch

F15 – 5 A .....Infra thermometer, monitoring device

F16 .....Reserve

* ARX40-2C/ ARX45-2C





Fuses and relays at the battery disconnector

F20 – 70 A.....Main fuse

F30 – 50 A.....Glowing

F21 – 25 A.....ECU main fuse

F22 – 5 A .....ECU

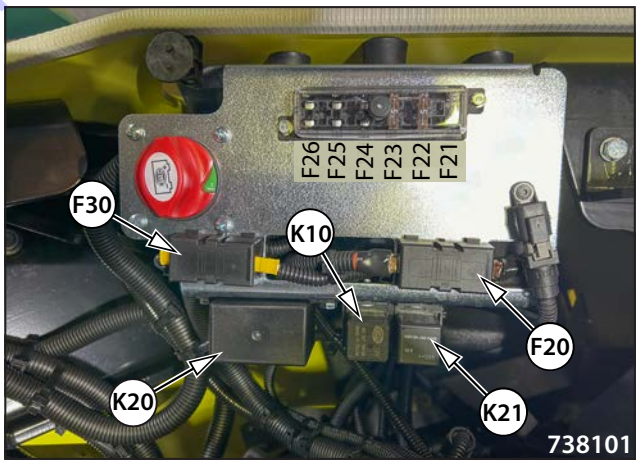
F23 – 7.5 A.....Fuel pump

F24 – 5 A .....Compaction module K6 Green beacon

K10 .....Start relay

K20 .....Glowing contactor

K21 .....Power supply relay



Relays in the machine

K1 Hydraulic oil cooler

K2 Sprinkling pump

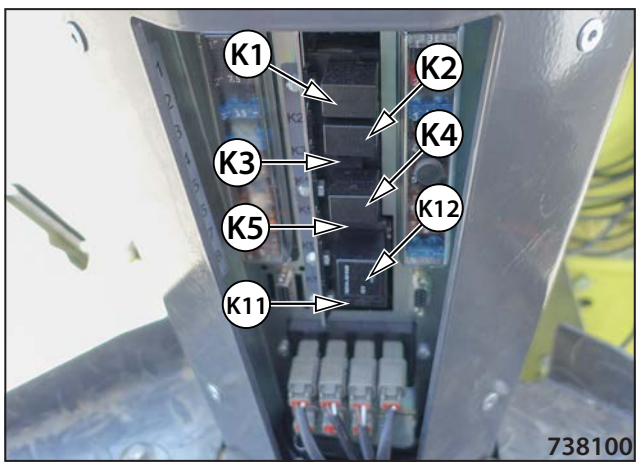
K3 Emulsion sprinkling pump

K4 Horn

K5 Warning beacon

K11 Interrupter

K12 Main fuse



Dashboard cover

The cover protects the dashboard from:

- weather effects
- vandalism
- handling by others

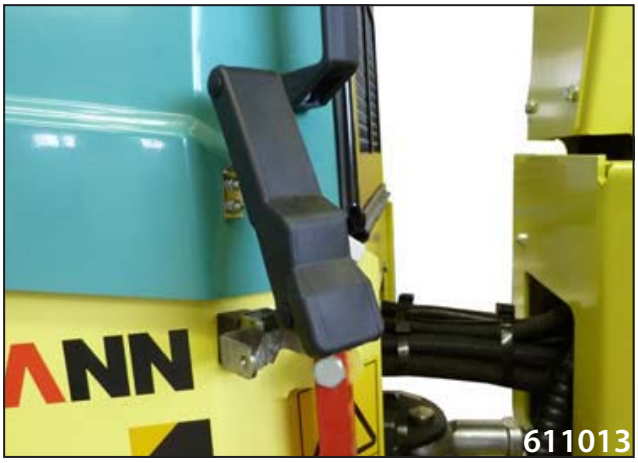
The cover of the dashboard can be locked with a padlock; the padlock is not delivered in the machine equipment.

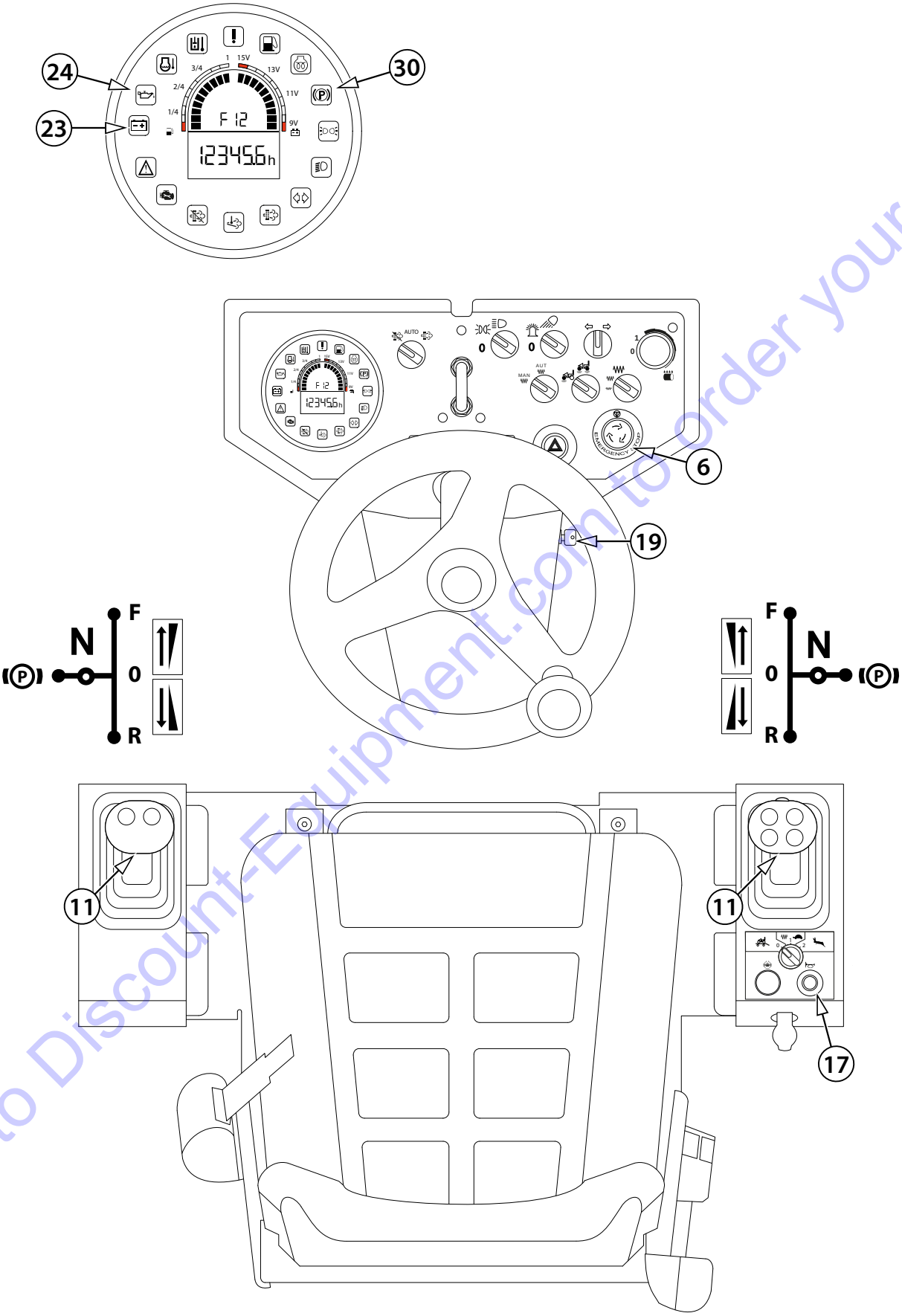
Engine bonnet

The bonnet protects the engine from:

- weather effects
- vandalism
- handling by others

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





2.7.1 Starting the engine

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

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

Starting the engine:

Turn on the battery disconnector.

Sit down on the seat.

Fasten your seat belt.

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

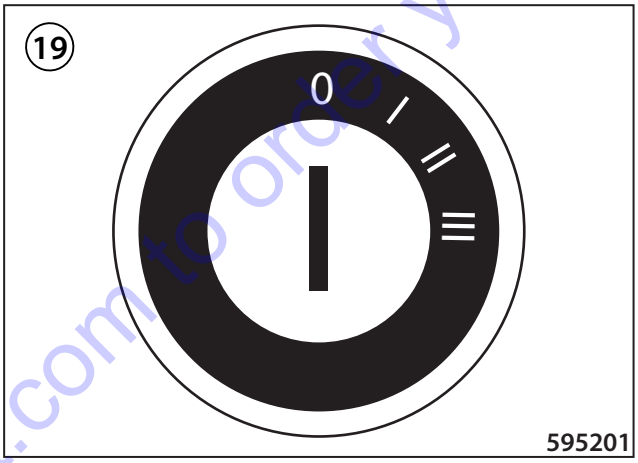
Check that the emergency brake (6) is not activated.

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

The indicator lamps for battery charging (23), engine lubrication (24), engine glowing (29) and parking brake (30) will light up.

The glowing indicator lamp (29) lights for 2–10 s according to the ambient temperature. Leave the key in the "I" position until the indicator lamp goes out. After the indicator lamp for glowing (29) goes out, use the warning horn (17) to signal that the engine is starting and start the engine by turning the key to the "III" position.

After the start, the indicator lamps for battery charging (23) and engine lubrication (24) must go out on the display.



Do not start the engine by turning the key to the "III" position before the indicator lamp for engine glowing (28) goes out.

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

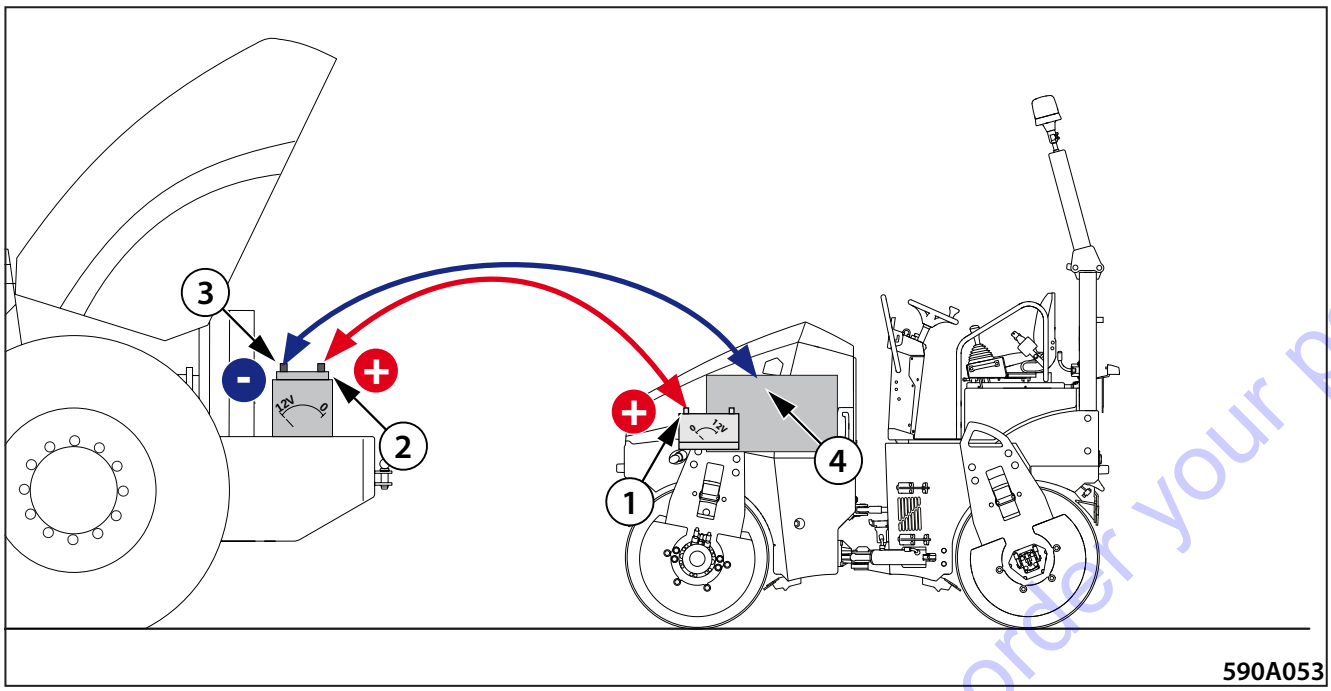
Do not start the engine for more than 30 seconds. Wait for 2 minutes before starting again.

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

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

Note

If the engine cannot be started or stops after a while, bleed the fuel system according to Chapter 3.6.47.



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

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

Always follow the undermentioned operation sequence.

1/ Connect one end of the (+) pole of the cable to the (+) pole of the discharged battery.

2/ Connect the other end of the (+) pole of the cable to the (+) pole.

3/ Connect one end of the (–) pole of the cable to the (–) pole of the external battery.

4/ Connect the other end of the (–) pole of the cable to any part of the started machine, which is attached to the engine (or with the engine block itself).

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

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

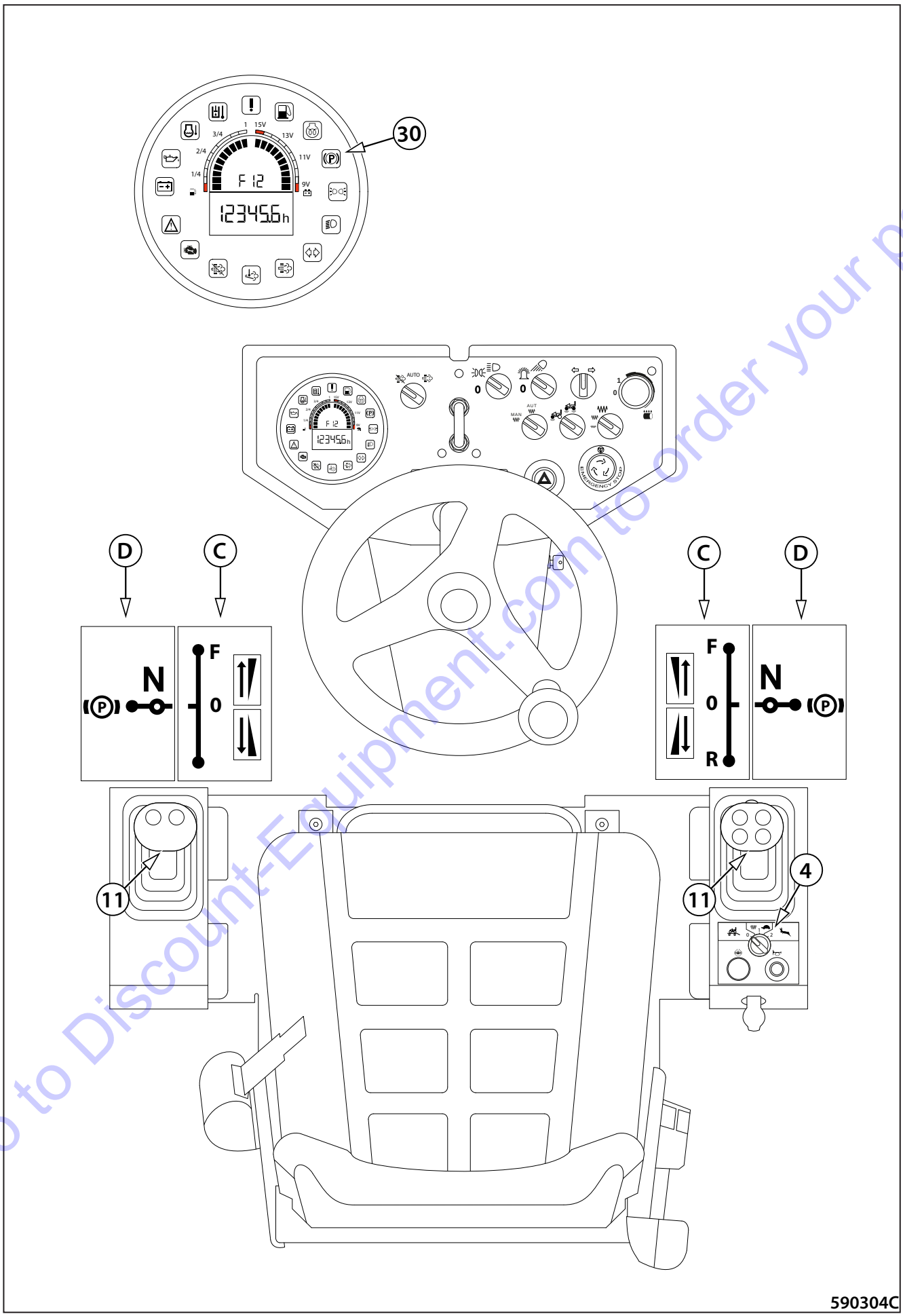
Uninsulated parts of clamps of the jump leads must not touch each other!

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

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

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

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



2.7.2 Drive and reverse drive

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

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

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

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

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

Engine speed

The engine speed is set automatically by moving the travel control (11).

- Idle engine speed (D)
  - Parking brake position (P)
  - Neutral position (N)
- Increased engine speed (C)
  - Zero position (0)
  - Forward travel (F)
  - Reverse travel (R)

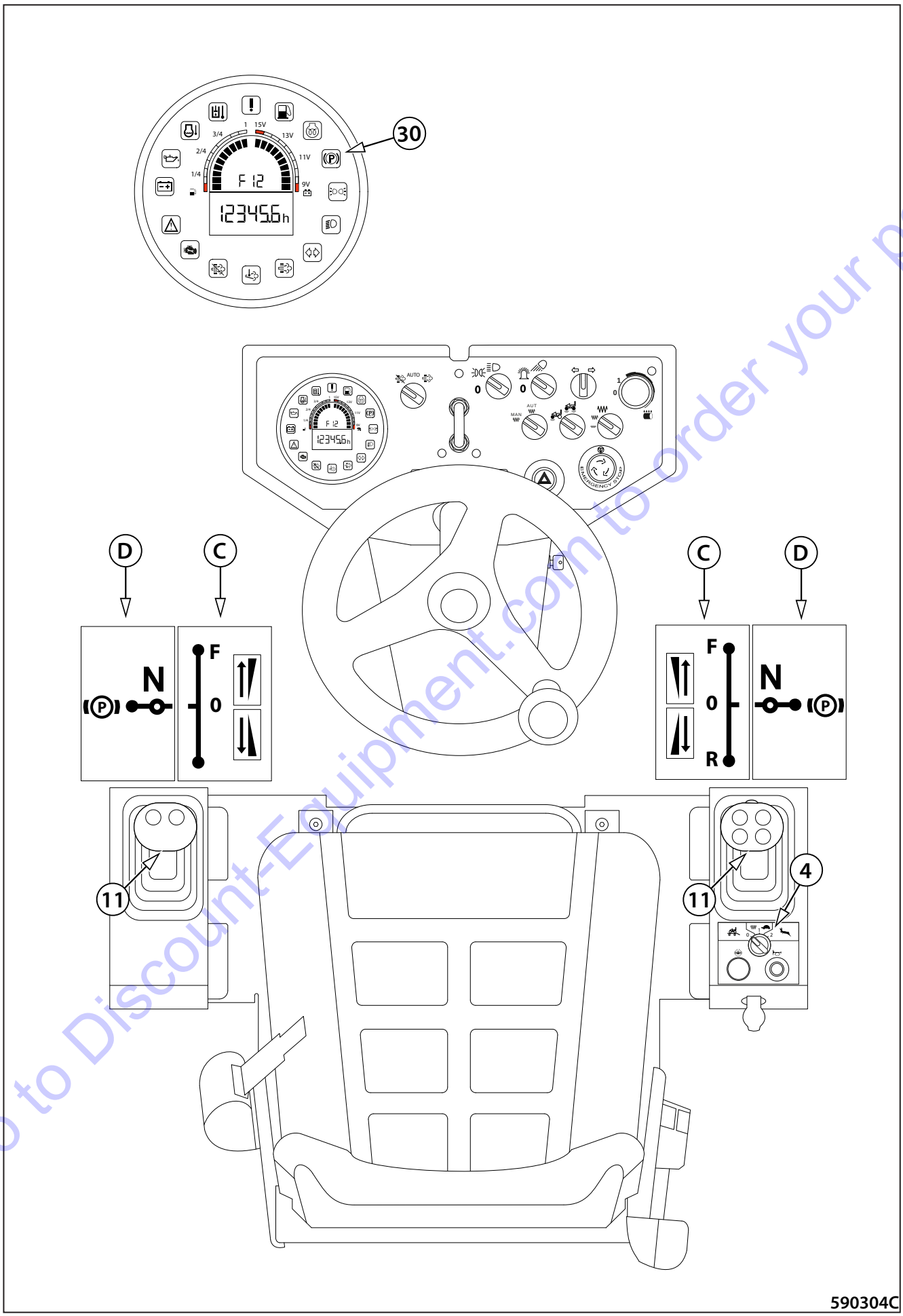
Selection of the travel direction

- Selection of the travel direction is set on the active travel control. Set and leave the inactive travel control in the parking brake position (P).
- Start the engine.
- Move the travel control (11) from the parking brake (P) to the neutral position (N) – releasing of the brakes, the parking brake indicator lamp (30) goes out. The engine idle speed is set.
- Move the travel control (11) to the position (0) and select a travel direction (F/R). The engine working speed is set.

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

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

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



Travel speed selection

- The travel speed is set on the active travel control. Set and leave the inactive travel control in the parking brake position (P).
- The travel speed corresponds to the displacement of the travel control (11) forward or rearward from the zero position (0) in the given operating mode (4).
- The travel speed can be changed with the travel mode switch (4).

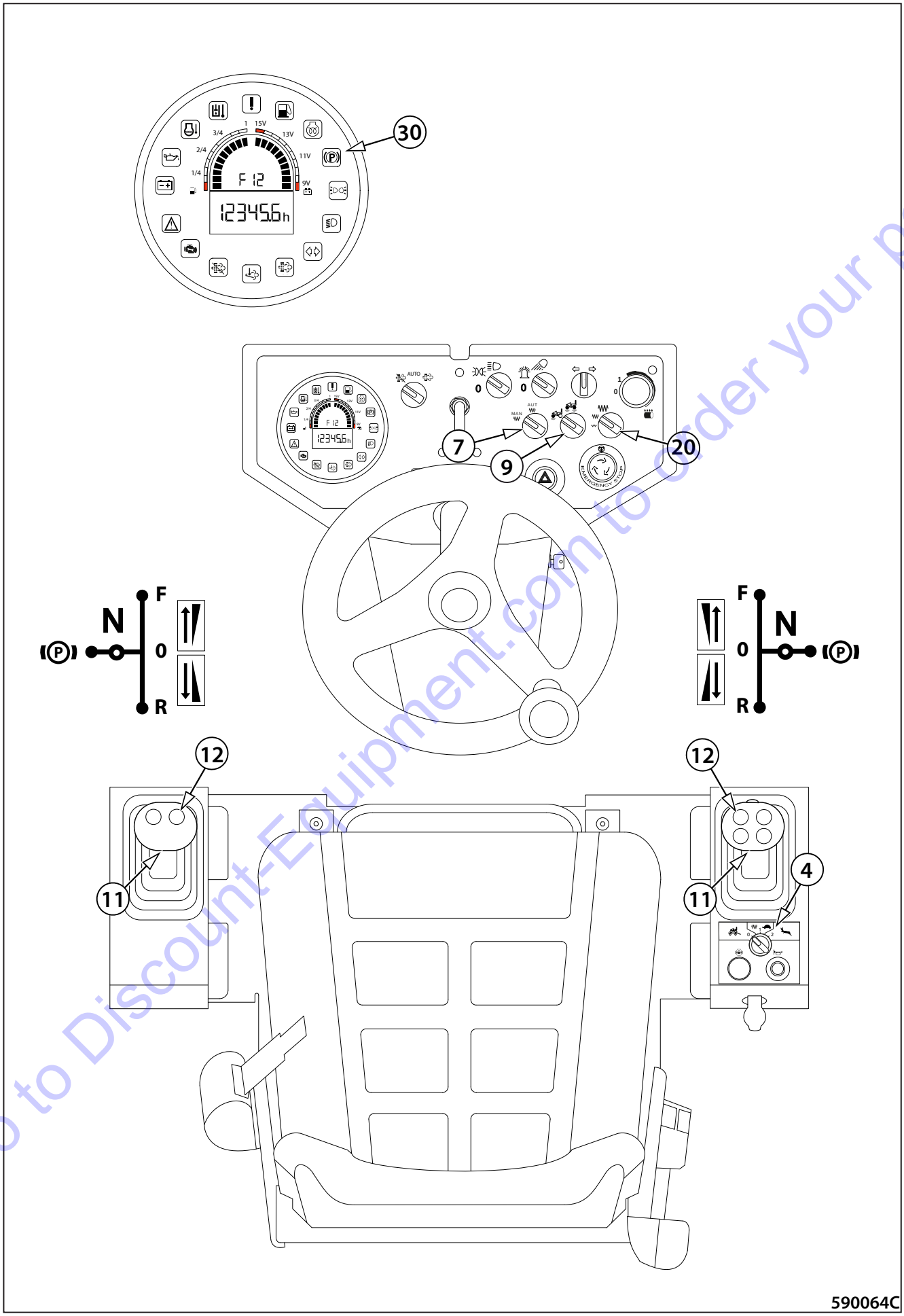
Panic response

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

Note

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

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



Machine travel and reversing with vibration

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

If the parking brake indicator lamp (30) is on, move the travel control (11) from the parking brake (P) position to the (0) position.

Manual mode

Use the vibration mode selector (7) to set the manual mode.

Select the vibration frequency using the vibration amplitude selector switch (20).

Use the vibrating drum selector (9) to select the front drum vibration or front and rear drum vibration.

Use the travel mode switch (4) to set mode "1" – the working mode of the machine.

Using the travel control (11) select the forward (F) or reverse (R) travel direction.

Turning on

Turn on the vibration with the switch (12).

Turning off

Turn off the vibration with the switch (12).

Note

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

Automatic mode

Use the vibration mode selector (7) to set the automatic mode.

Use the vibrating drum selector (9) to select the front drum vibration or front and rear drum vibration.

Use the travel mode switch (4) to set mode "1" – the working mode of the machine.

Using the travel control (11) select the forward (F) or reverse (R) travel direction.

Turning on

Press the vibration switch (12).

Vibration and sprinkling will automatically activate when the travel speed is more than 1–2 km/h (0.6–1.2 MPH).

Vibration and sprinkling will automatically deactivate when the travel speed is less than 1–2 km/h (0.6–1.2 MPH).

Vibration and sprinkling remains enabled even after the travel control (11) has been smoothly shifted through the zero position (0).

Turning off

Turn off the vibration with the switch (12).

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

Panic response

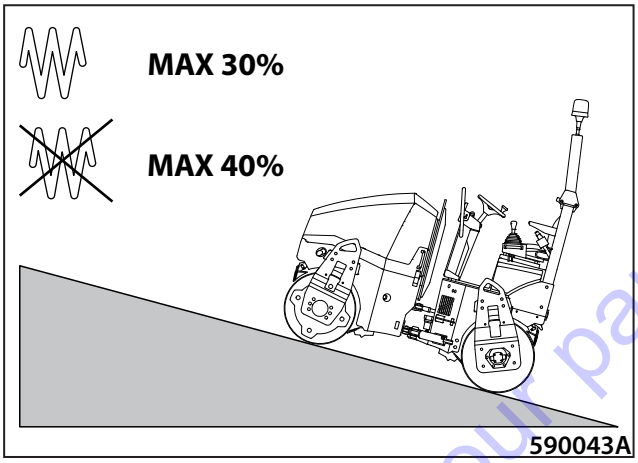
The immediate stop of the machine using the travel control (11) applies to all of the travel modes of the machine. When the travel control (11) is changed to the opposite position through (0) within 1 second, the machine will stop – the parking brake will be engaged and the engine will keep running,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

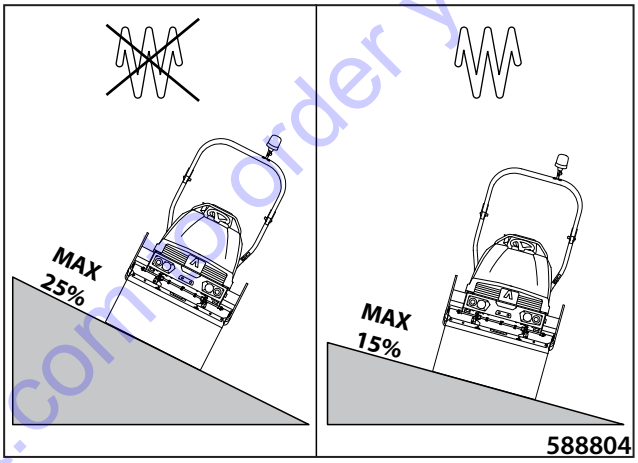
For the maximum permissible slope gradient when driving uphill and across the slope gradient, see figure.

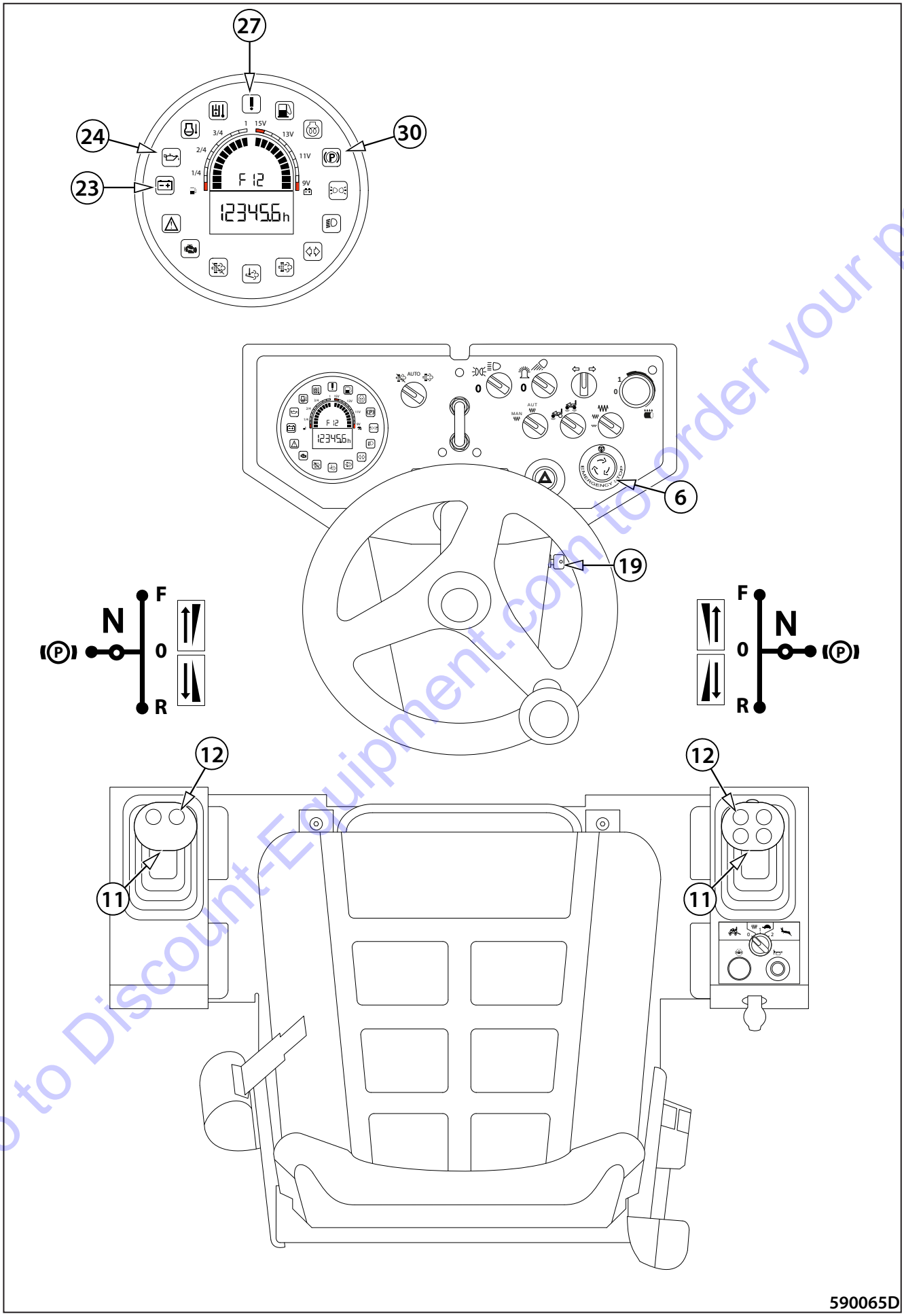
The given values will be lower depending on adhesive conditions and the instantaneous weight of the machine!

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

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







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2.7.3 Stopping the machine and turning off the engine

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

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

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

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

Turn off the battery disconnector when shutting down the machine.

2.7.4 Machine emergency stop

In a dangerous situation requiring the machine to immediately stop, press the emergency brake button (6).
The machine immediately stops, the engine shuts down.

Turning on:

Press the emergency brake button (6). The machine immediately stops, the engine shuts down.

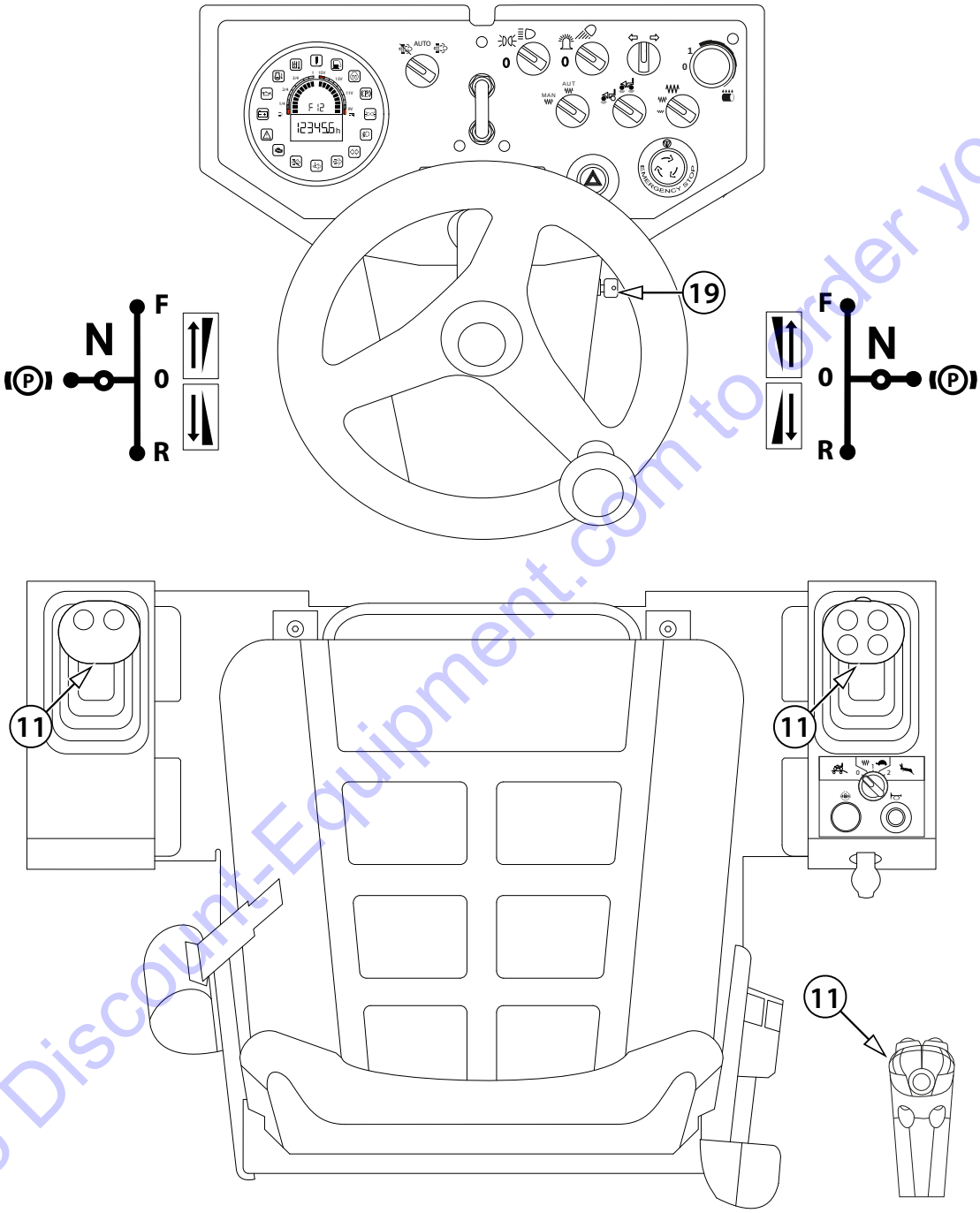
The indicator lamps for battery charging (23), engine lubrication (24), parking brake (30) and emergency stop (27) will light up on the display.

Turning off:

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

The indicator lamps for battery charging (23), engine lubrication (24) and parking brake (30) will remain light up on the display.

Move the travel control (11) to the brake position (P) and then start the engine.



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2.7.5 Machine parking

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

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

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

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

Clean the machine from dirt.

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

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

Note

The padlock is not delivered in the machine equipment.

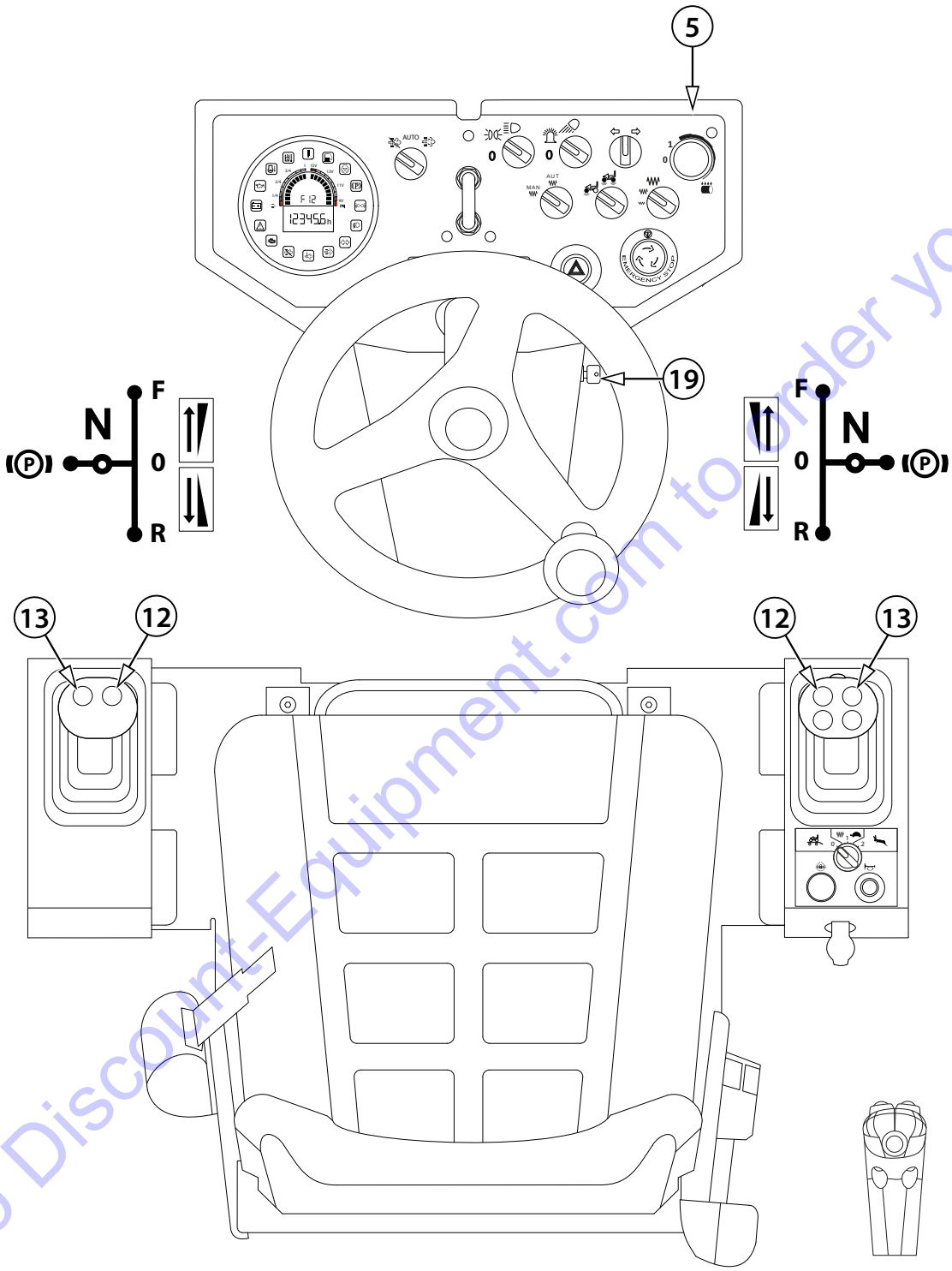
Protect the dashboard and the engine compartment from unauthorized access of others by locking the dashboard cover and the engine bonnet.

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

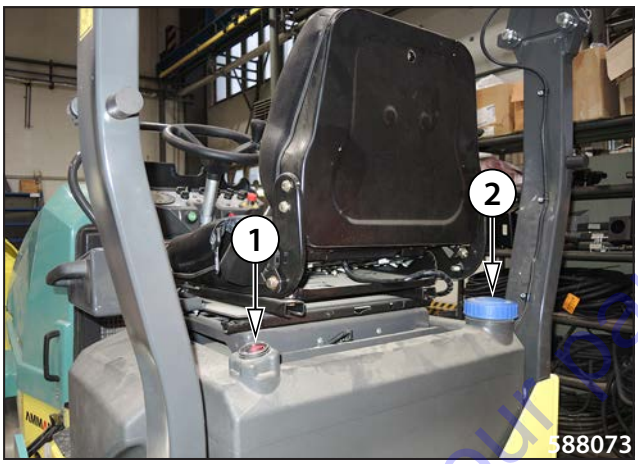
2.7.6 Panic response

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

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



2.7.7 Sprinkling



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

Hole to fill the water tank (2).

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

Turn on the sprinkling with the sprinkling potentiometer (5).

Position 0 – sprinkling OFF

Position 1 – sprinkling ON

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

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

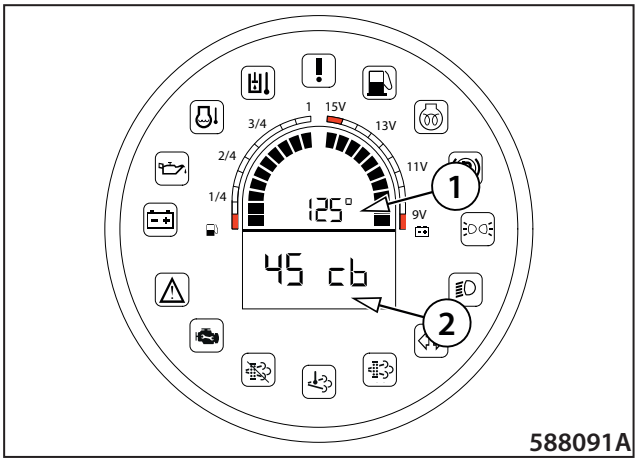
Using the sprinkling switch (13), it is possible to turn on the sprinkling at any time, e.g. before driving on a compacted bitumen surface.

Note

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

Sprinkling automatically deactivates if the machine is not moving and automatic vibration is set.

2.7.8 ACE Force (optional equipment)



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

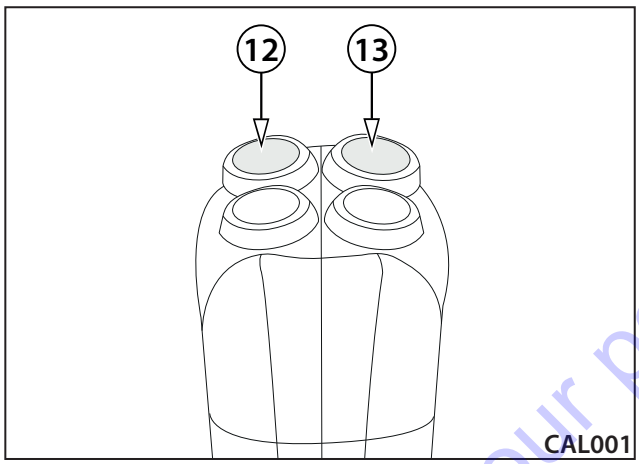
1 - surface temperature

2 - compaction value

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

2.7.9 Infrathermometer (optional)

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



Control

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

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

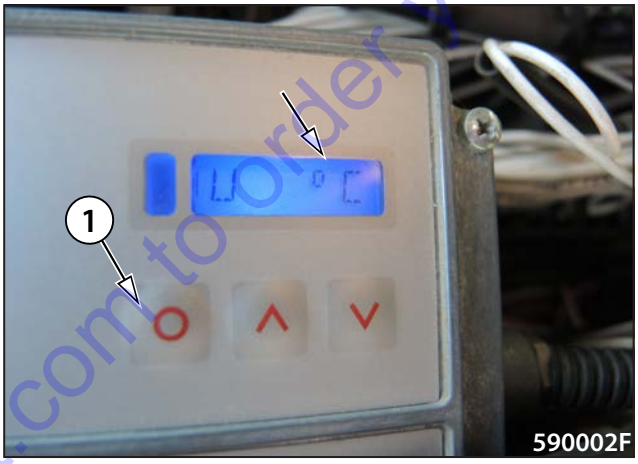
After setting the required parameters on the display of the infra thermometer, the values are saved automatically.

Remove the cover.

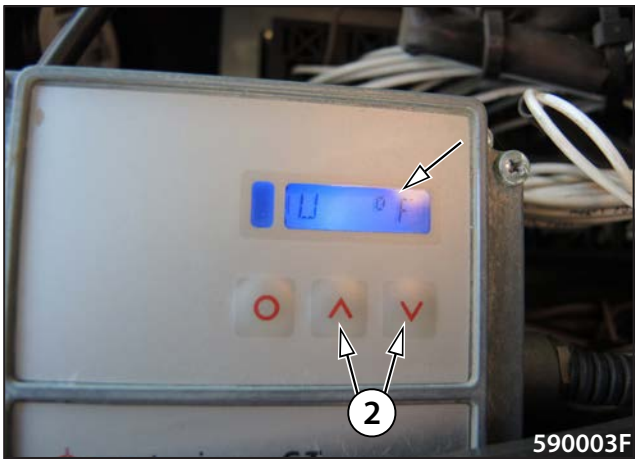
Turn the key in the ignition box to the “I” position.

The infra thermometer display will light up.

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

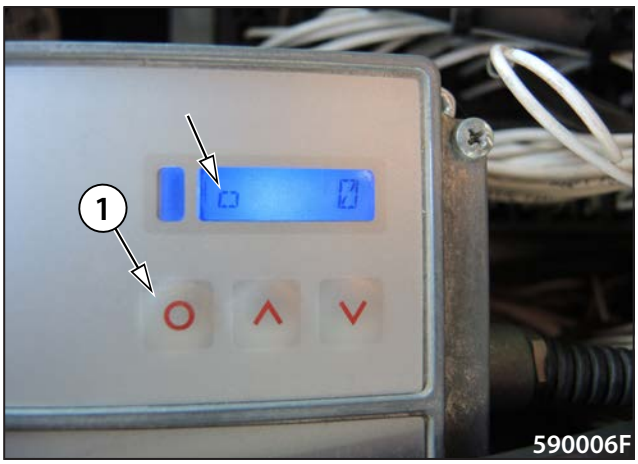


Switch over with the UP and DOWN arrows (2) until °F appears on the display.

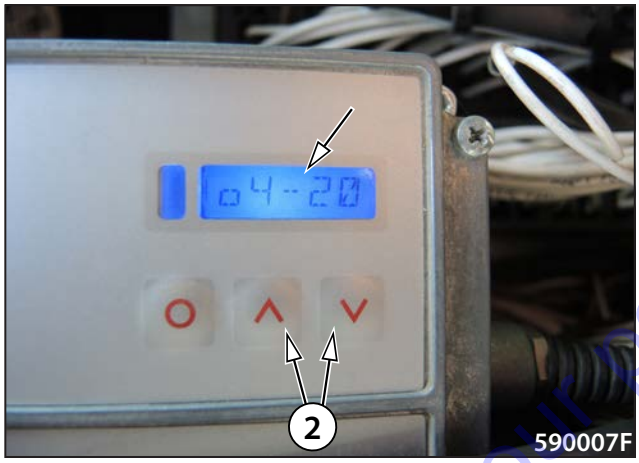


Set the current output of the infra thermometer.

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

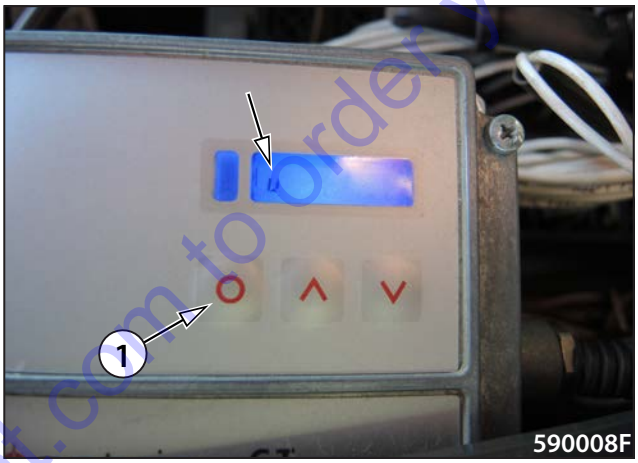


- Switch over with the UP and DOWN arrows (2) until 4–20 mA appears on the display.

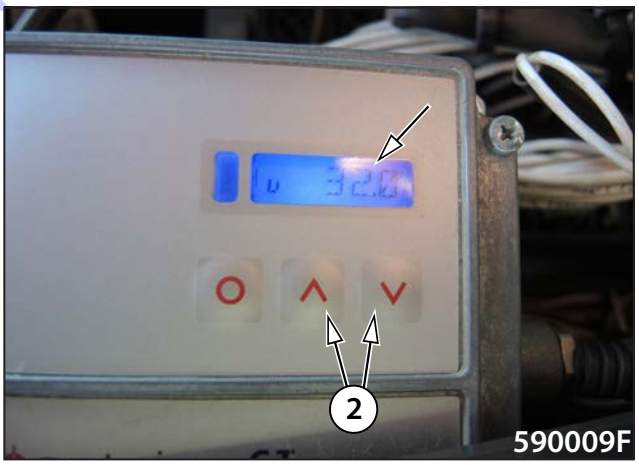


Set the minimum temperature.

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

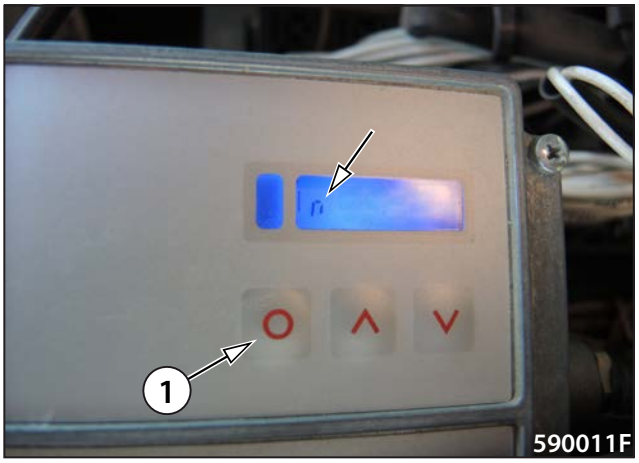


- Switch over with the UP and DOWN arrows (2) until the value of 32.0 °F appears on the display.

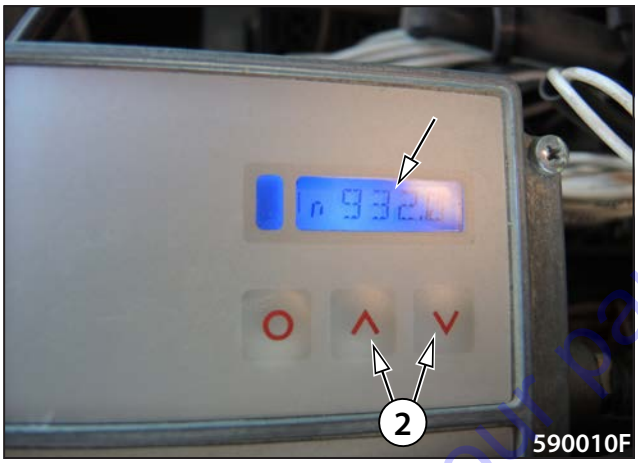


Set the maximum temperature.

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

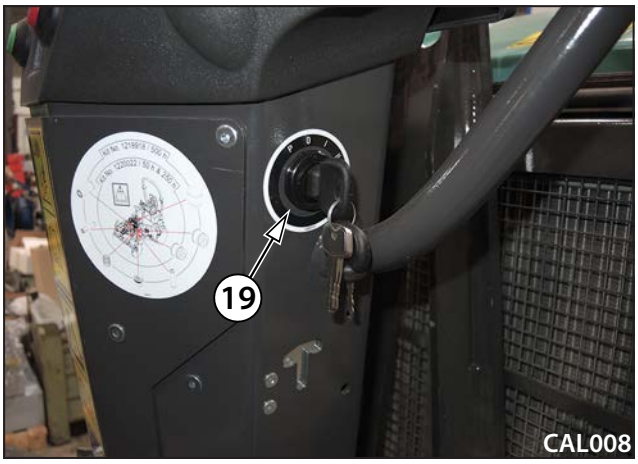


- Switch over with the UP and DOWN arrows (2) until the value of 932.0 °F appears on the display.



- Mount the cover.

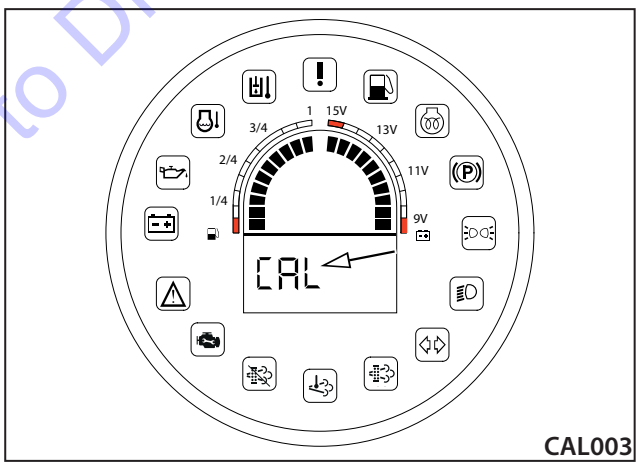
Turn the key in the ignition box to the "I" position.

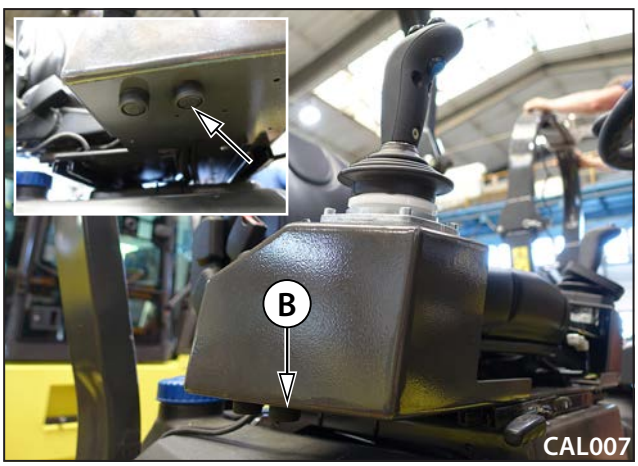


Sit in the driver's seat (activation of the seat switch).

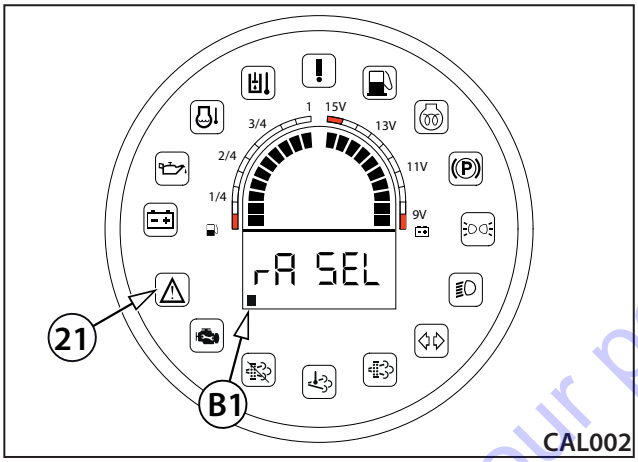
Set the travel control to the parking brake position "P".

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

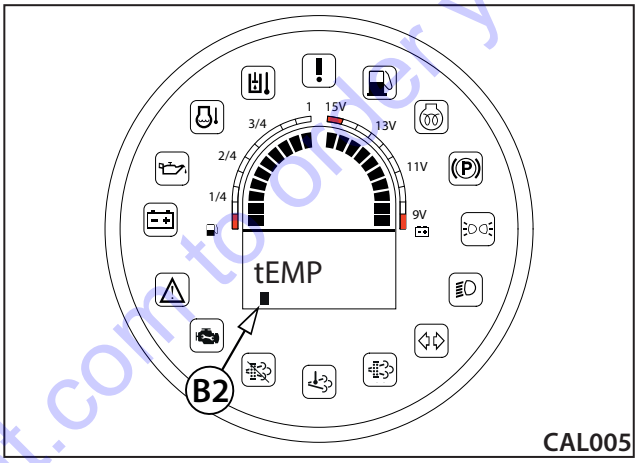




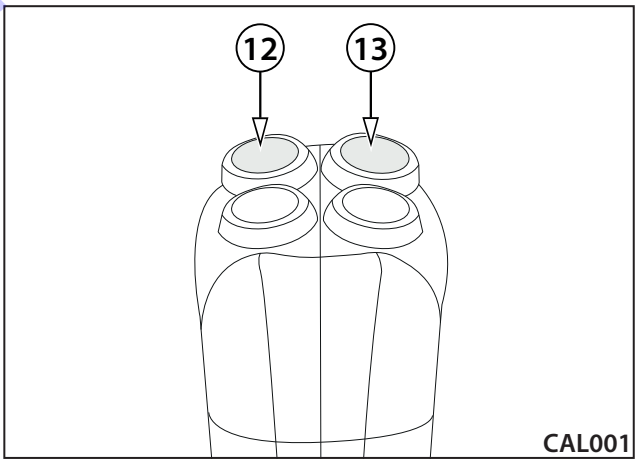
After 5 seconds, the display shows B1 and, at the same time, the error message indicator lamp (21) starts flashing.



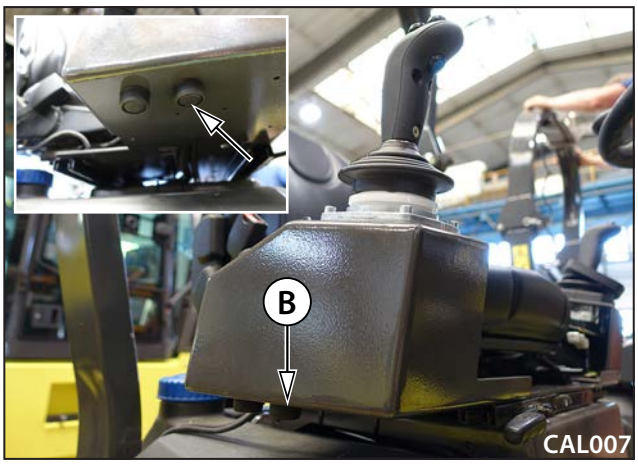
Using the Select button (13), scroll to the B2 tab (Fahrenheit/ Celsius temperature unit selection) and press OK (12) to confirm.



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



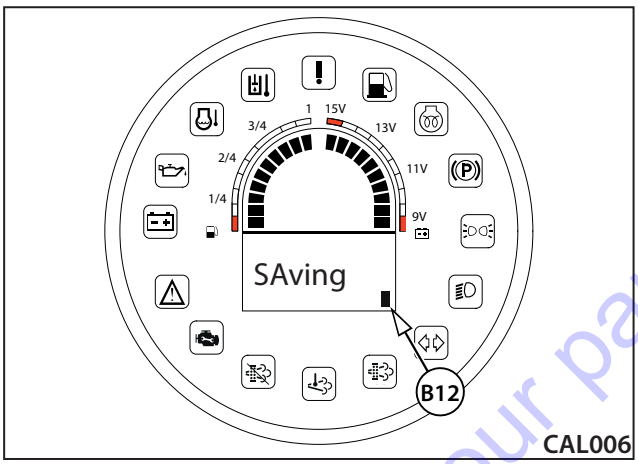
Use the Select button (13) to scroll to the B12 tab and press the calibration button (B) for 5 seconds.



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

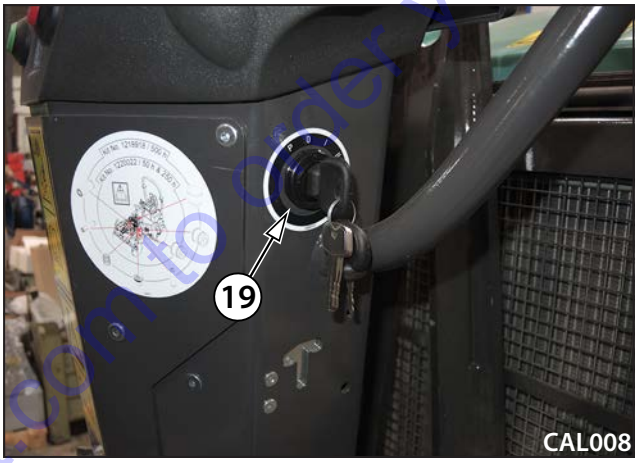
If the parameters are OK, they are saved and the display shows the "Saved" status.

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



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

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



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

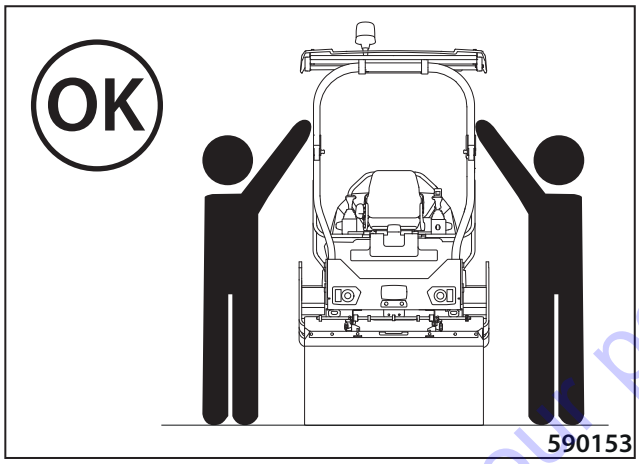
2.7.10 ROPS lifting and lowering

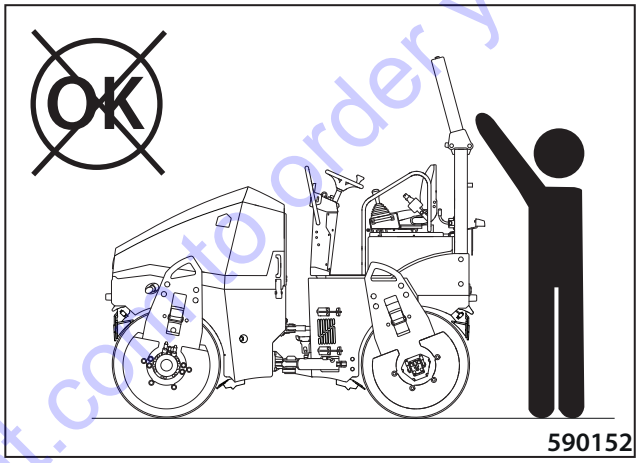
Lower or raise the ROPS frame always with the help of another person.

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

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

Handle the ROPS frame always from the left and right side of the machine. There must be no persons under the ROPS frame while the frame is being lowered and raised. There is a risk of injury due to the falling ROPS frame.





ROPS frame fixture

There is a dismantled ROPS frame fixture attached under the engine bonnet on the left side.

Install the ROPS frame fixture before its use according to Fig. 590151.

The ROPS frame fixture assists the operator when lowering and raising the ROPS frame.

Lowering procedure of the ROPS frame

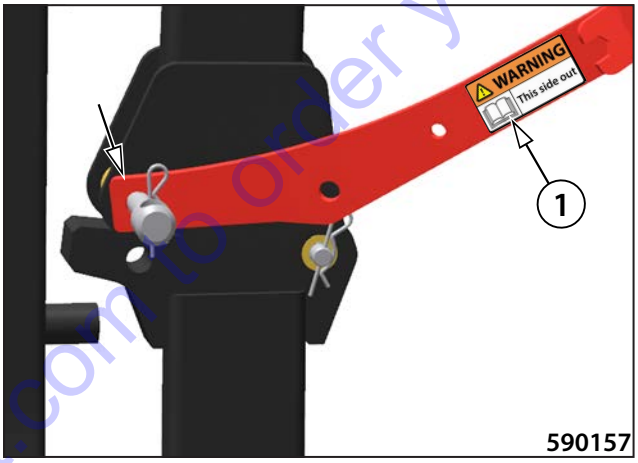
Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Put the fixture on the outside of the frame and install the front pins of the ROPS frame from the outside of the ROPS frame.

Put the fixture on the frame so that the warning label (1) on the fixture points out of the machine.

Secure the front pins with the cotter pins from the outside of the ROPS frame.

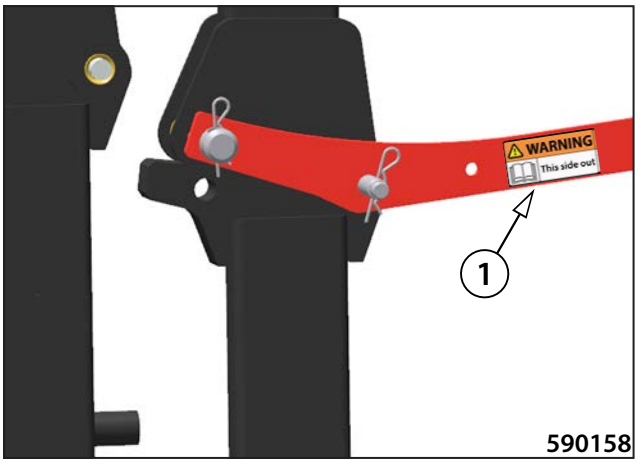


Remove the cotter pins of the rear pins of the ROPS frame.

Loosen the rear pins by ca. 1–2 turns.

Put on the fixture.

Secure the rear pins with the cotter pins from the outside of the ROPS frame.



Note:

Insert the cotter pins of the rear pins into the hole further away from the pin shoulder.

Using the ROPS frame fixture lower the frame completely.

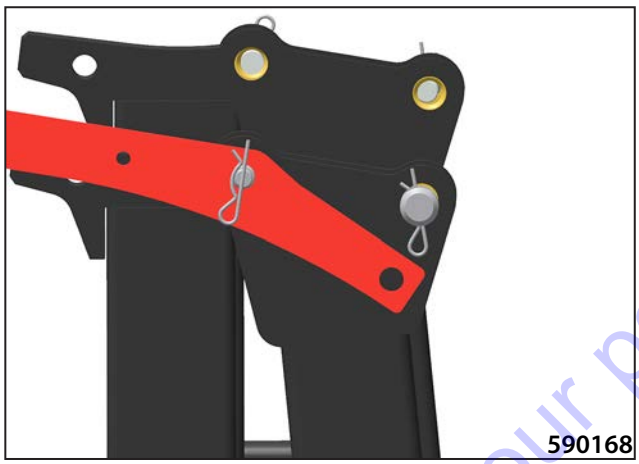
Take extra care when lowering the ROPS frame. There is a risk of injury due to the falling ROPS frame.

Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Rotate the ROPS frame fixture.

Install the front pins and secure them with the cotter pins.



Remove the cotter pins of the rear pins of the ROPS frame.

Take out the ROPS frame fixture.

Tighten the rear pins and secure them with the cotter pins.

Note:

Insert the cotter pins of the rear pins into the hole closer to the pin shoulder.

Raising procedure of the ROPS frame

Remove the cotter pins of the rear pins of the ROPS frame.

Loosen the rear pins by ca. 1–2 turns.

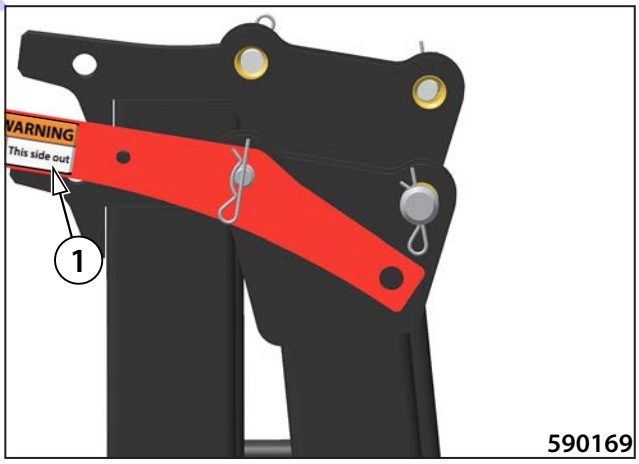
Put the fixture on the outside of the frame.

Put the fixture on the frame so that the warning label (1) on the fixture points out of the machine.

Secure the rear pins with the cotter pins from the outside of the ROPS frame.

Note:

Insert the cotter pins of the rear pins into the hole further away from the pin shoulder.



Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Put on the fixture and install the front pins of the ROPS frame from the outside of the ROPS frame.

Secure the front pins with the cotter pins from the outside of the ROPS frame.

Using the ROPS frame fixture raise the frame completely.

Take extra care when raising the ROPS frame. There is a risk of injury due to the falling ROPS frame.

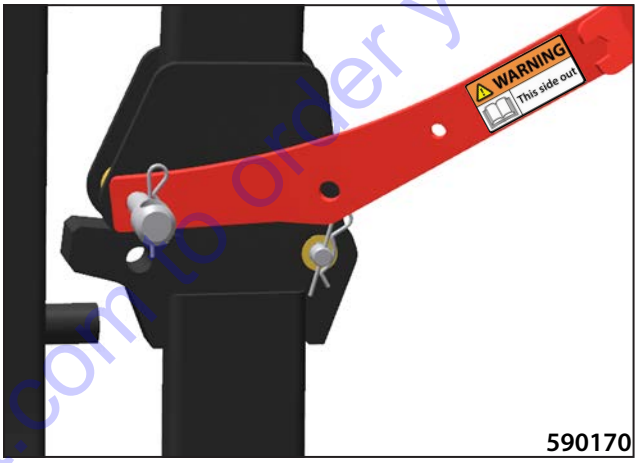
Remove the cotter pins of the rear pins of the ROPS frame.

Rotate the ROPS frame fixture.

Tighten the rear pins and secure them with the cotter pins.

Note:

Insert the cotter pins of the rear pins into the hole closer to the pin shoulder.

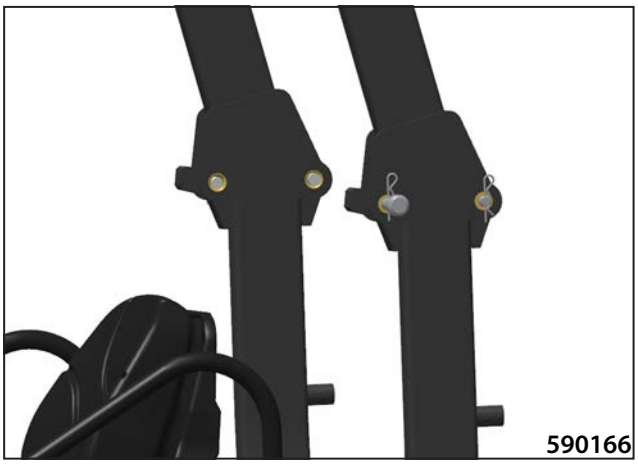


Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Take out the ROPS frame fixture.

Attach the front pins from the inside of the ROPS frame and secure them with the cotter pins.



There is a risk of injury due to the falling ROPS frame when it is being lowered and raised. During machine operation, both sides of the frame must be reliably secured with pins and cotter pins.

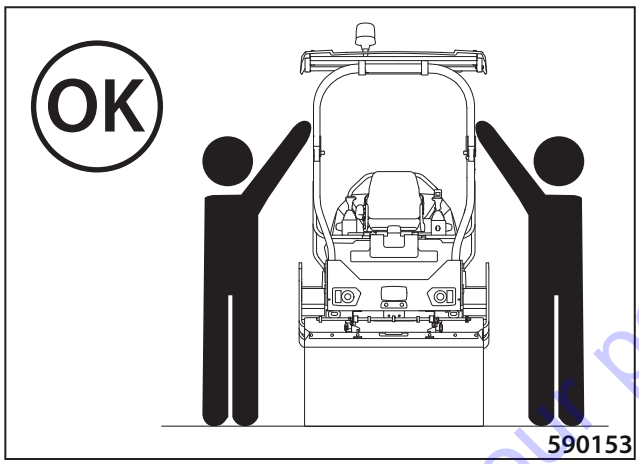
2.7.10.1 Raising and lowering of the ROPS with a plastic canopy

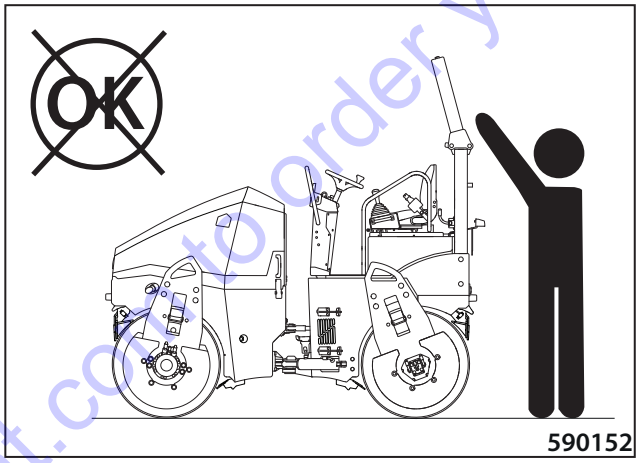
Lower or raise the ROPS frame always with the help of another person.

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

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

Handle the ROPS frame always from the left and right side of the machine. There must be no persons under the ROPS frame while the frame is being lowered and raised. There is a risk of injury due to the falling ROPS frame.



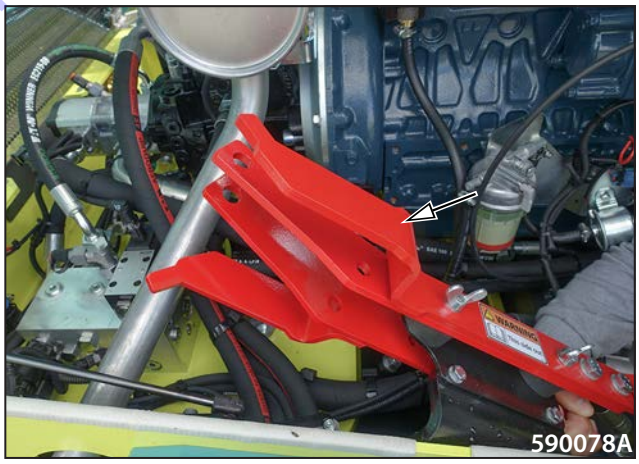


ROPS frame fixtures

There are dismantled ROPS frame fixtures attached under the engine bonnet on the left side.

Install the ROPS frame fixtures before their use according to Fig. 590151.

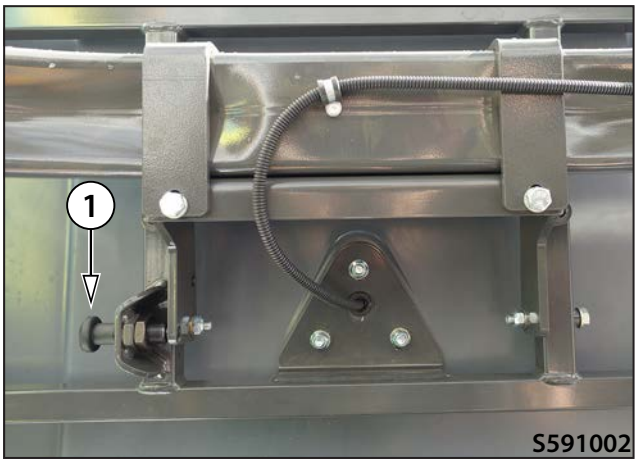
The ROPS frame fixtures assist the operator when lowering and raising the ROPS frame.



Lowering procedure

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

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



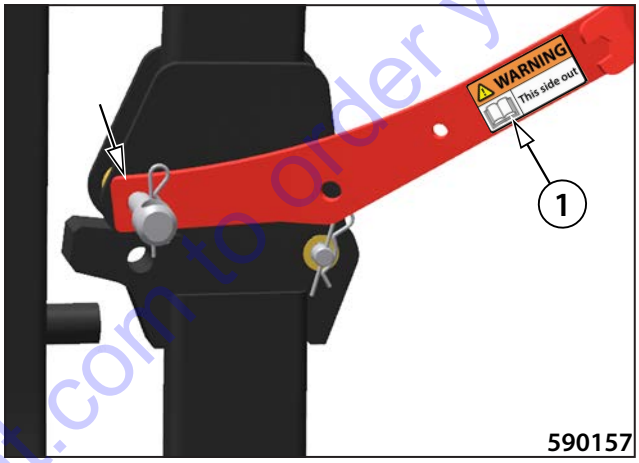
Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Put the fixtures on the outside of the frame and install the front pins of the ROPS frame.

Place the fixtures on the frame so that the warning label (1) on the fixture points out of the machine.

Secure the front pins with the cotter pins from the outside of the ROPS frame.



Remove the cotter pins of the rear pins of the ROPS frame.

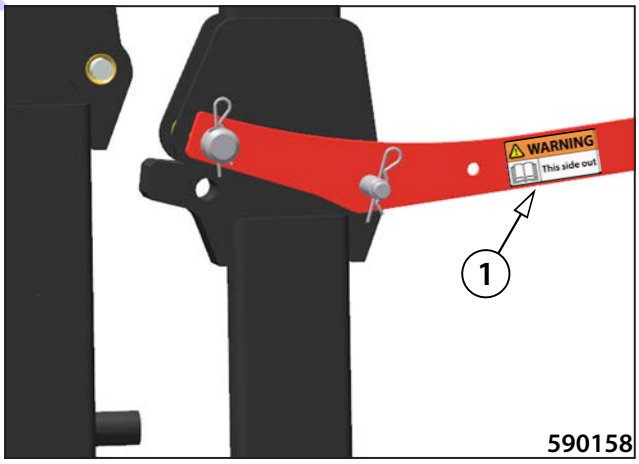
Loosen the rear pins by ca. 1–2 turns.

Put on the fixtures.

Secure the rear pins with the cotter pins from the outside of the ROPS frame.

Note:

Insert the cotter pins of the rear pins into the hole further away from the pin shoulder.



Using the ROPS frame fixtures lower the frame completely.

Take extra care when lowering the ROPS frame. There is a risk of injury due to the falling ROPS frame.

Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

Rotate the ROPS frame fixture.

Install the front pins and secure them with the cotter pins.

Remove the cotter pins of the rear pins of the ROPS frame.

Take out the ROPS frame fixtures.

Tighten the rear pins and secure them with the cotter pins.

Note:

Insert the cotter pins of the rear pins into the hole closer to the pin shoulder.

ROPS lifting

Remove the cotter pins of the rear pins of the ROPS frame.

Loosen the rear pins by ca. 1–2 turns.

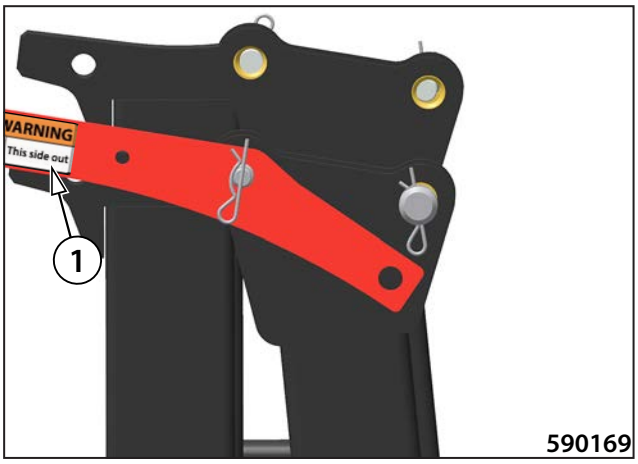
Put the fixtures on the outside of the frame.

Place the fixtures on the frame so that the warning label (1) on the fixture points out of the machine.

Secure the rear pins with the cotter pins from the outside of the ROPS frame.

Note:

Insert the cotter pins of the rear pins into the hole further away from the pin shoulder.



Remove the cotter pins on the front pins of the ROPS frame.

Put on the fixtures.

Secure the front pins with the cotter pins from the outside of the ROPS frame.

Using the ROPS frame fixtures raise the frame completely.

Take extra care when raising the ROPS frame. There is a risk of injury due to the falling ROPS frame.

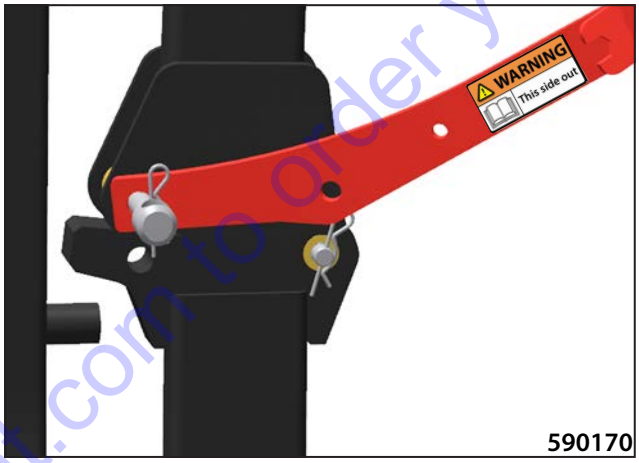
Remove the cotter pins of the rear pins of the ROPS frame.

Rotate the ROPS frame fixture.

Tighten the rear pins and secure them with the cotter pins.

Note:

Insert the cotter pins of the rear pins into the hole closer to the pin shoulder.

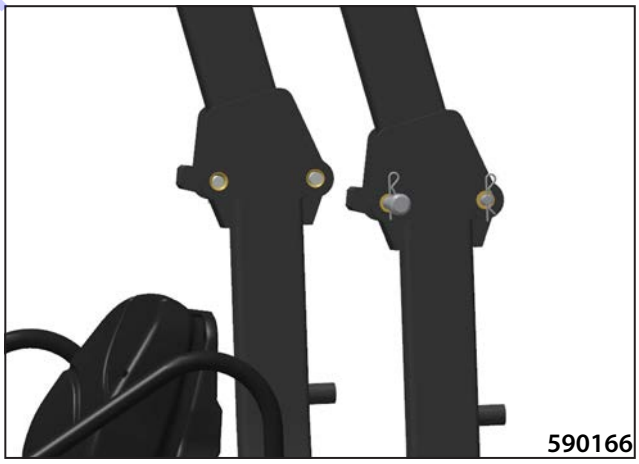


Remove the cotter pins on the front pins of the ROPS frame.

Remove the front pins of the ROPS frame.

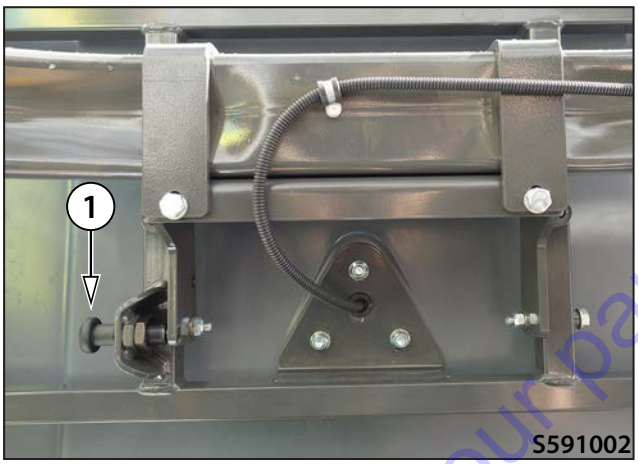
Take out the ROPS frame fixtures.

Attach the front pins from the inside of the ROPS frame and secure them with the cotter pins.



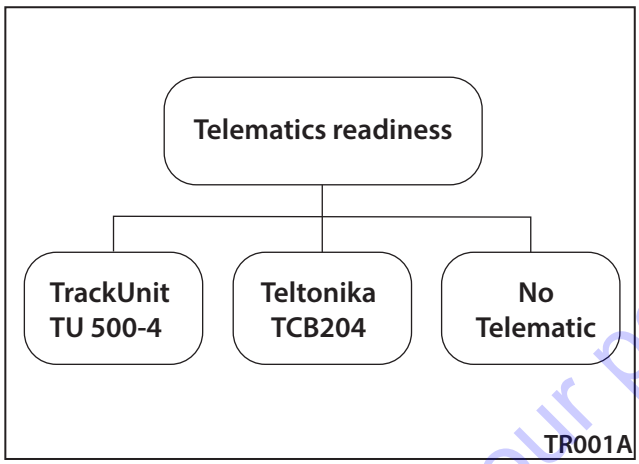
There is a risk of injury due to the falling ROPS frame when it is being lowered and raised. During machine operation, both sides of the frame must be reliably secured with pins and cotter pins.

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



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

2.7.11 Telematics readiness



Global positioning system with telemetry that monitors operating systems of the machine (machine start, engine speed, fuel consumption, number of engine hours, etc.) and 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.

Turn off the battery disconnector before installation or maintenance.

Installation shall only be carried out by trained personnel according to the wiring diagram.

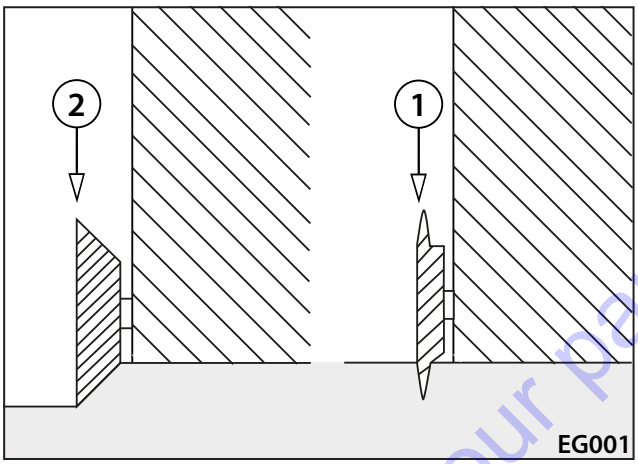
In case of a failure, contact your dealer or Ammann Technical Support.

2.7.12 Edge cutter (optional equipment)

The edge cutter set contains a cutting and compaction disc.

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

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



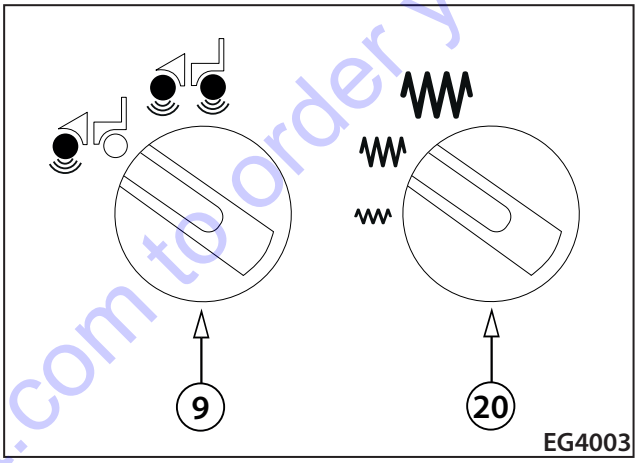
Note

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

Edge cutter pre-adjustment

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

Set the vibration amplitude selector switch (20) to the middle position (low frequency – low amplitude) or to the position fully in the left (high frequency – low amplitude).



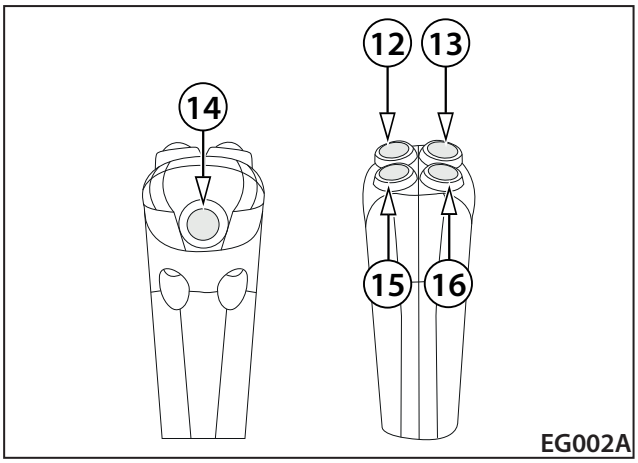
It is forbidden to change the vibration amplitude while driving.

Note

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

Control procedure

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



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

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

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

Note

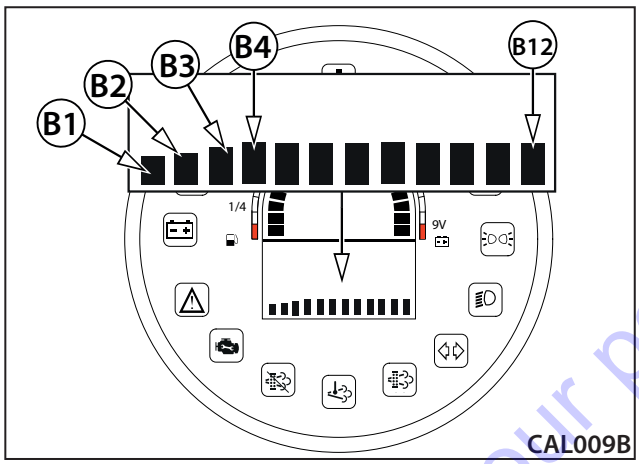
The water inlet of edge cutter sprinkling only works when continuous drum sprinkling is on.

Turn on vibration with the vibration switch (12).

Note

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

2.7.13 Calibration mode



Tabs

B1 Ramp selection (rA SEL)

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

B2 Fahrenheit/Celsius temperature unit selection (tEMP)

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

B3 Left lever selection (LEFtLu)

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

B4 Telematics option (tELSEL)

- no telematics unit connected (nO tcu)
- unit without CAN bus data connected (nO cAn)
- unit with CAN bus data connected (cAn)
- return one level back (BAC)

B12 Save and exit (SAvE)

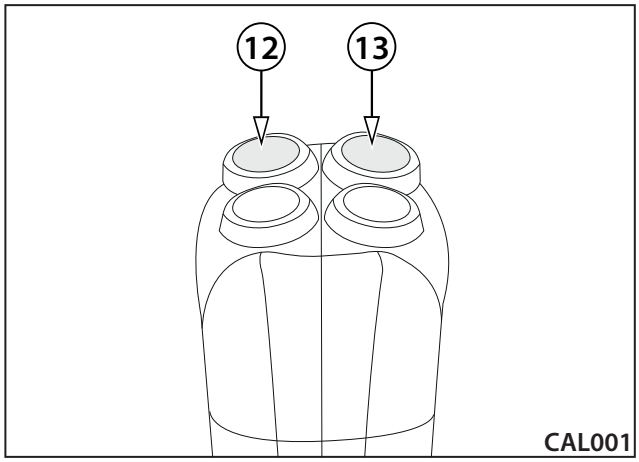
- Values saved
- Error saving values

Control

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

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

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



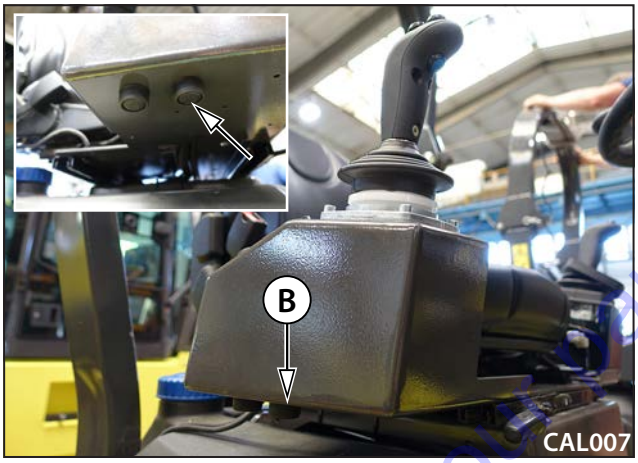
Calibration procedure:

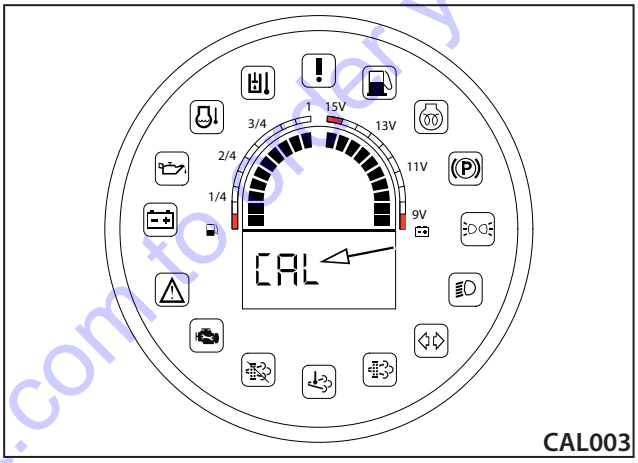
Turn the key in the ignition box to the "I" position.

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

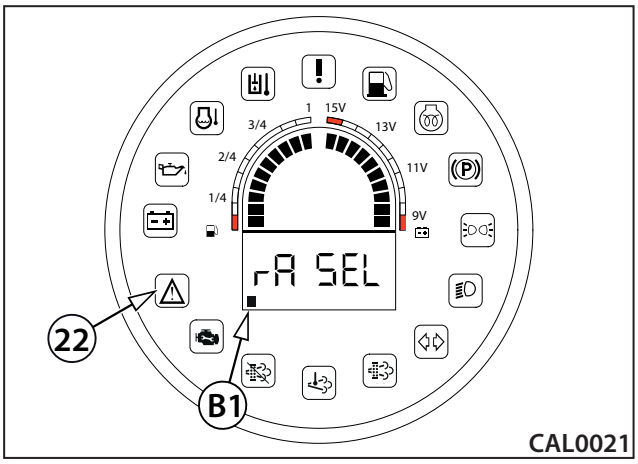
Set the travel control to the parking brake position "P".

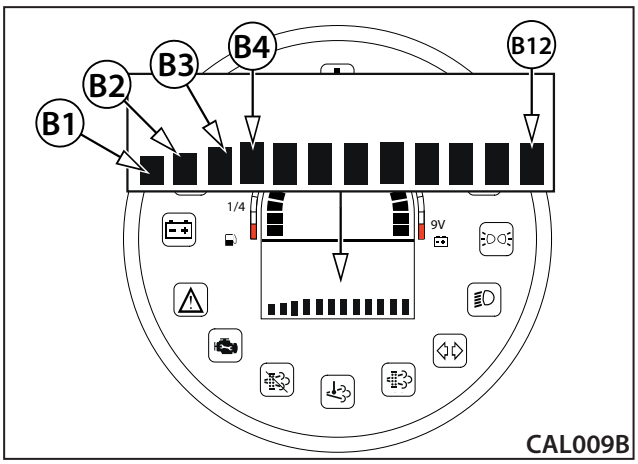
Press the calibration button (B) for 5 seconds. While the button is held down, the display shows the "CAL" status.





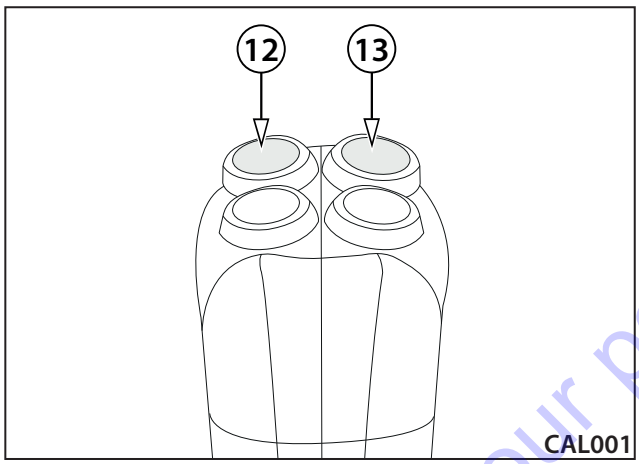
After 5 seconds, the display shows B1 and, at the same time, the error message indicator lamp (22) starts flashing. The error message indicator lamp (22) flashes for the duration of the calibration mode.



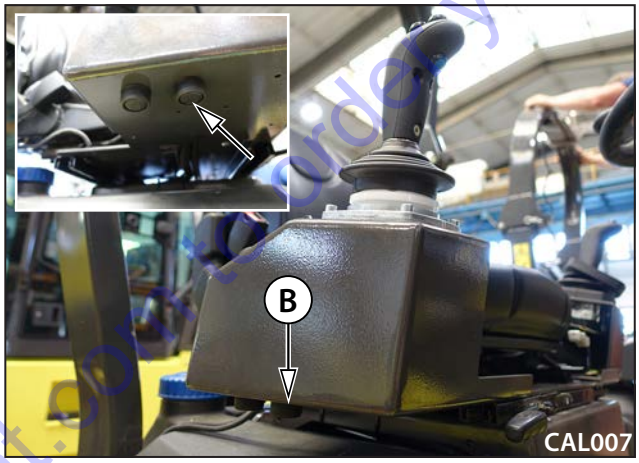


Use the select button (13) to select the tab and press OK (12) to confirm. The display will show the current state of the set parameter (e.g. SOFT when choosing the ramp – B1).

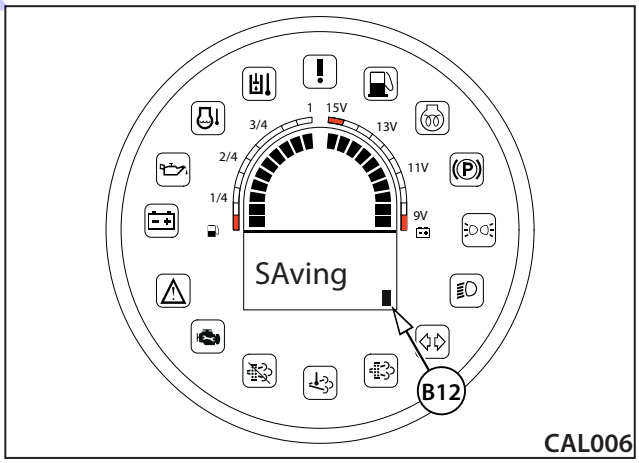
Select the parameter using the Select button (13) and confirm with the OK button (12).



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



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



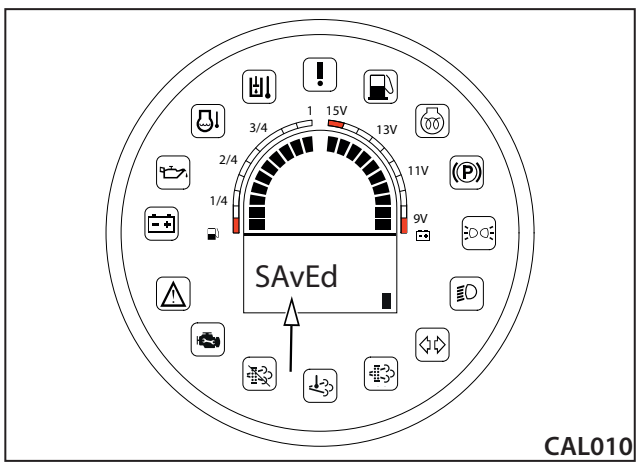
If the parameters are OK, the data saved and the display shows the "Saved" status.

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

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

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

In caseof an error, the display shows the B12.c "Error" message. The ignition then must be switched to the "0" position.



Possible errors:

Error saving new values (the value is out of the permitted range).

Engine start/stop in calibration mode.

2.7.14 Principles of use of the machine with a diesel particulate filter (DPF)

2.7.14.1 Diesel particulate filter (DPF)

- It absorbs solid particles contained in exhaust gases and reduces fine dust in the emissions produced by diesel engines.
- Conditions for maintaining the DPF in a fully functional state.
  - Use fuels with low sulphur content (according to Chapter 3.2.2).
  - Use only the oil recommended by the engine manufacturer (according to Chapter 3.2.1).
  - Do not interfere with the DPF, do not tamper with it.
  - When operating the machine, do not leave the switch in the DPF regeneration suppression position. Operate the machine only when the switch is in the AUTO position.
  - Replace the DPF after 6000 hours or after 5 years at the latest.
  - Avoid short engine operating times and low engine load (long engine idling times).

2.7.14.2 Diesel particulate filter (DPF) regeneration

- A process in which accumulated solid particles burn in the diesel particulate filter.
- During regeneration, keep away from flammable or explosive materials and do not touch any part of the particulate filter system.
- The diesel particulate filter regeneration can be done in three ways:
  - passive regeneration
  - active automatic regeneration
  - active parking regeneration
- The following table explains the indicator lamps displayed on the screen with the regeneration switch set to the AUTO position. If the indicator lamps are different, set the regeneration switch to the AUTO position and follow the table.

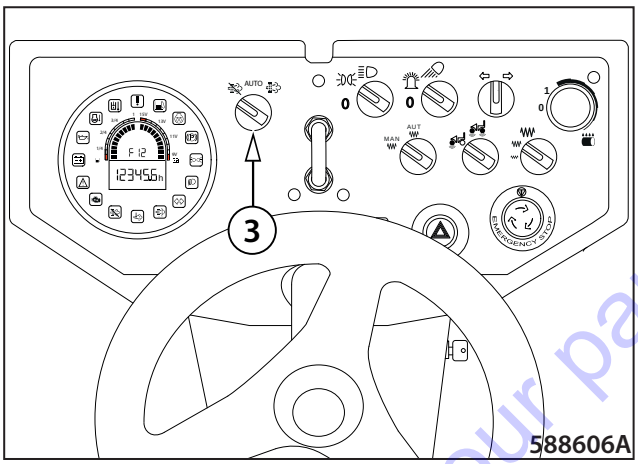
Before the start of regeneration			
 AMN120 **Indicator lamp of high exhaust gas temperature**	 AMN118 **DPF clogging indicator lamp**	**Description**	**Procedure**
Off	Off	DPF does not require regeneration	
Lighting	Lighting/flashing	Active automatic regeneration in progress	According to Chapter 2.7.14.2.2
Off	Lighting/flashing	Active parking regeneration required	According to Chapter 2.7.14.2.3

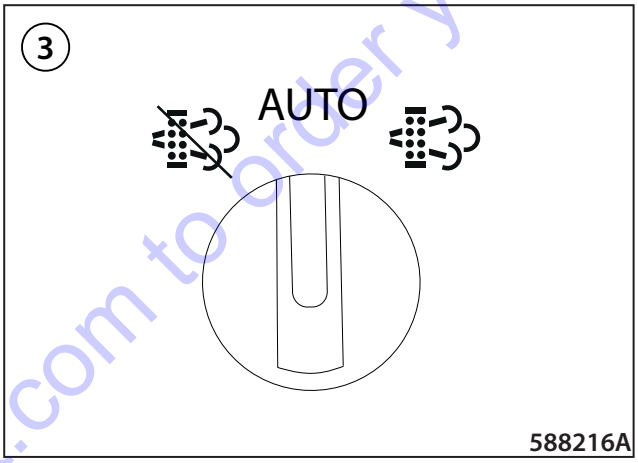
Regeneration progress			
 AMN120 **Indicator lamp of high exhaust gas temperature**	 AMN118 **DPF clogging indicator lamp**	**Description**	**Procedure**
Lighting	Lighting/flashing	"Active automatic regeneration in progress Active parking regeneration in progress"	According to Chapter 2.7.14.2.2 According to Chapter 2.7.14.2.3

End of regeneration			
 AMN120 **Indicator lamp of high exhaust gas temperature**	 AMN118 **DPF clogging indicator lamp**	**Description**	**Procedure**
Off	Off	Correct diesel particulate filter (DPF) cleaning performed	
Off	Lighting/flashing	Correct diesel particulate filter (DPF) cleaning not performed	Contact AMMANN / KUBOTA service

2.7.14.2.1 Passive regeneration

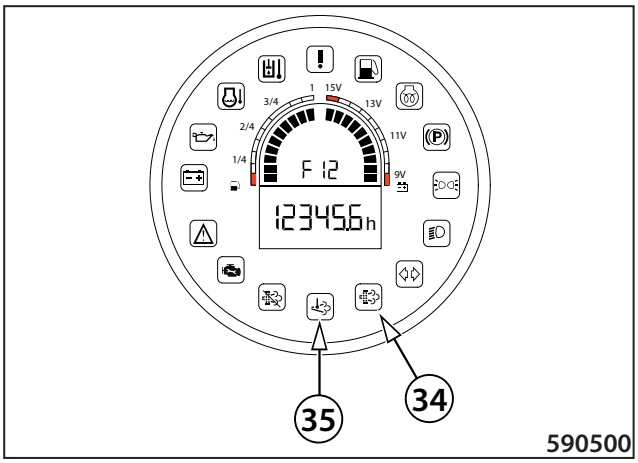
- Occurs due to high exhaust gas temperature independently of the degree of DPF clogging.
- To enable the start of regeneration, the switch (3) must be in the AUTO position.
- The regeneration starts and stops without any interaction between the operator and the machine.





2.7.14.2.2 Automatic active regeneration

- It is a controlled regeneration, during which higher temperatures are reached in the exhaust system using additional fuel injection into the exhaust gases to achieve smooth active regeneration process.
- To start the regeneration, the switch (3) must be in the AUTO position.
- Work with the machine is not interrupted.
- Do not suppress regeneration, do not reduce engine power and do not turn off the engine. Suppression of the regeneration can result in DPF damage.
- Once the DPF is cleaned, the process automatically stops.



The duration of automatic regeneration depends on the conditions of use and the engine temperature.

When the regeneration is suppressed, the diesel particulate filter (DPF) may get damaged.

2.7.14.2.2.1 Suppression of DPF regeneration

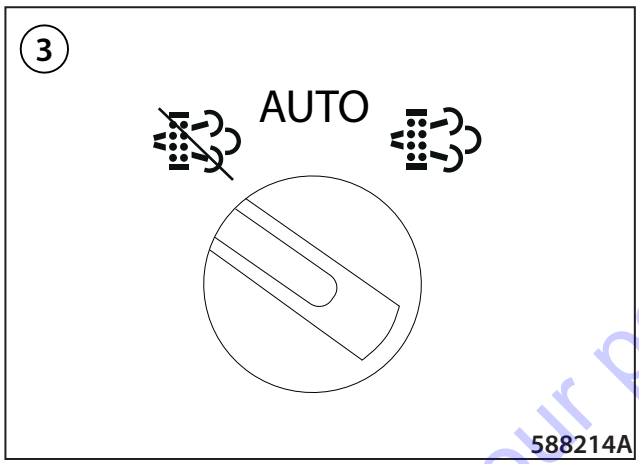
Active automatic DPF regeneration can be suppressed by holding the regeneration switch (3) in the left position for 5 seconds – the regeneration is switched off.

When DPF regeneration suppression is activated, the DPF regeneration suppression indicator lamp (35) lights up on the display.

The regeneration switch (3) returns to the AUTO position after it was held.

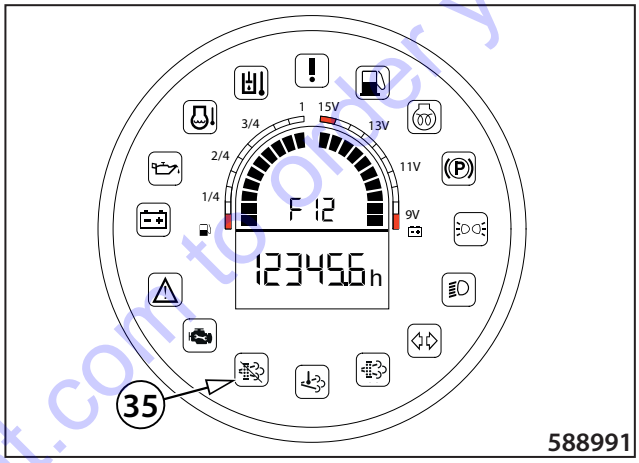
Suppress regeneration only when absolutely necessary (e.g. when working indoors).

Long-term and/or repeated suppression of regeneration results in DPF damage.



The regeneration suppression can be switched off:

- By holding the regeneration switch (3) again in the left position for 5 sec.
- By switching off the engine – turning the key to position "0".

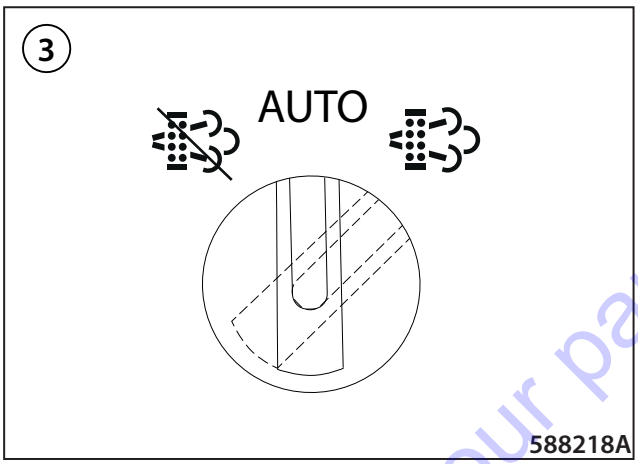


After the regeneration has been completed, let the machine run for at least 10 minutes at idle speed to remove excessive heat generated during the process from the engine compartment.

Ignoring a request of the machine for regeneration results in DPF damage.

2.7.14.2.3 Active parking regeneration

Regeneration is required if the filter clogging exceeds a limit when it is not possible to clean the filter in the above ways.



Before starting regeneration, follow these steps:

- Place the machine on a level and firm surface in an open and well-ventilated area.
- Keep away from flammable or explosive materials.
- Warm up the machine to the operating temperature. The coolant temperature must be around 50 °C.
- Set the travel control to the parking brake position "P" – engine idle speed.
- The fuel tank must be filled to at least ¼ of the maximum capacity.

Note

Interfering with any of the above controls during active regeneration will automatically stop the regeneration process.

After starting the regeneration, hold the switch (3) in the right position for 2 seconds. After regeneration starts, the engine speed increases.

Do not turn off the engine or suppress the regeneration during regeneration.

Once the DPF is cleaned, the process automatically stops and the engine speed decreases.

Regeneration takes approximately 25–45 minutes depending on ambient conditions and the degree of filter clogging.

Note

If the indicator lamps do not turn off at the end of regeneration, contact KUBOTA / AMMANN service.

After the regeneration has been completed, let the machine run for at least 10 minutes at idle speed to remove excessive heat generated during the process from the engine compartment.

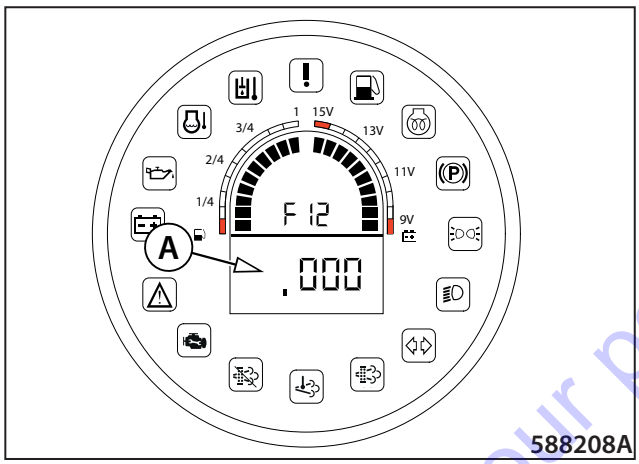
Do not suppress the regeneration and do not turn off the engine during regeneration. The diesel particulate filter (DPF) may get damaged.

Risk of burns. Keep away from flammable or explosive materials.

2.7.14.3 Diesel particulate filter (DPF) clogging

Switching the key in the ignition box (20) to the "I" position displays DPF clogging.

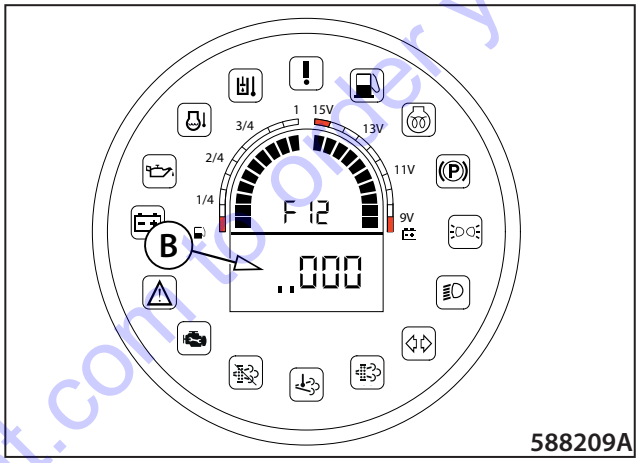
First, a soot clogging value – SOOT (A) – is displayed for a period of 3–5 sec. DPF clogging is reduced after regeneration depending on the previous DPF degree.



Subsequently, an ash clogging value – ASH (B) – is displayed for a period of 3–5 sec.

The soot clogging value (SOOT) and ash clogging value (ASH) displays are only for checking that the active parking regeneration is correctly performed.

When the diesel particulate filter is properly cleaned, the SOOT value decreases and the ASH value increases.

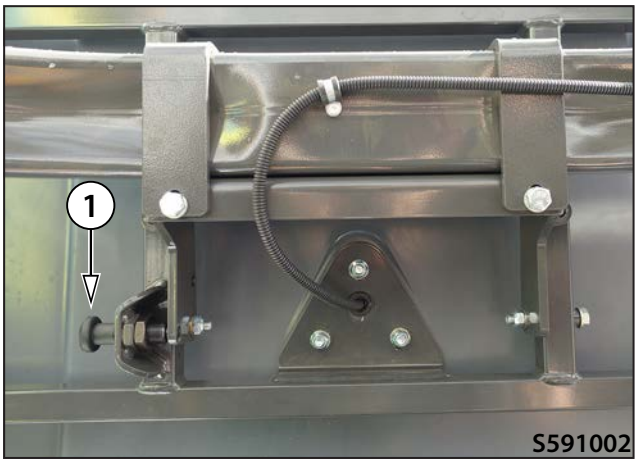


2.7.15 Lowering and raising of the plastic canopy

Lowering procedure

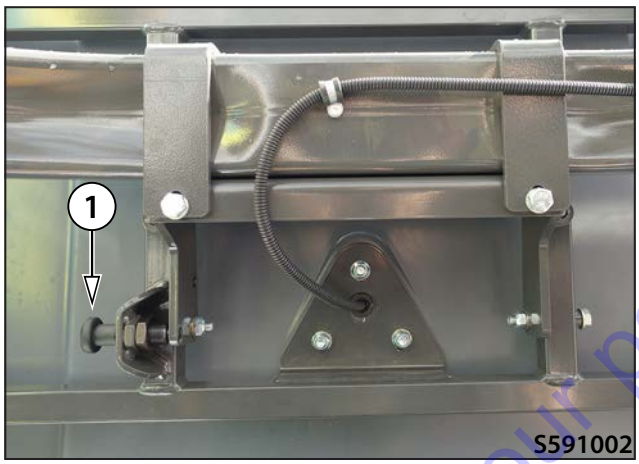
Remove the screws (2x) at the bottom of the plastic canopy.

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



Raising procedure

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



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

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

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

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

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

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

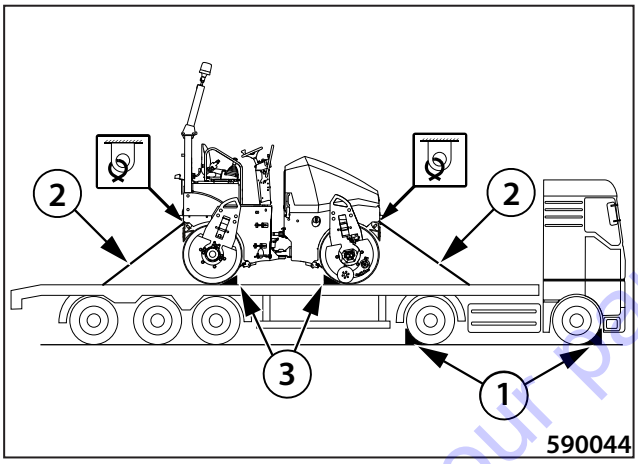
When loading and unloading, the vehicle transporting the machine must be braked and mechanically protected against accidental movement using wedges (1).

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

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

If the machine is equipped with folding scrapers, the scrapers must be folded, see Chapter 3.6.9 Scraper adjustment.

Take extra care when loading a machine with a plastic canopy.



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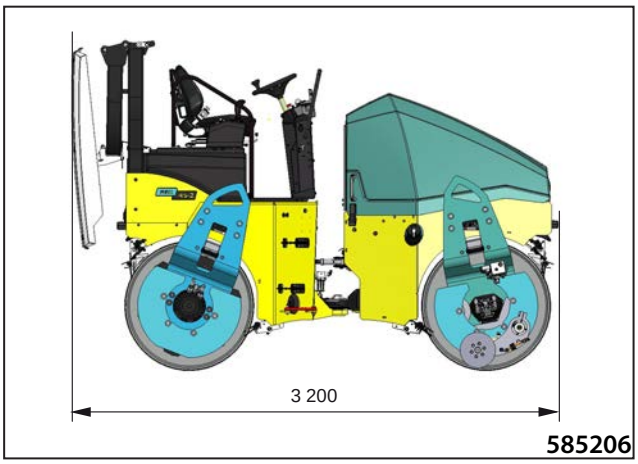

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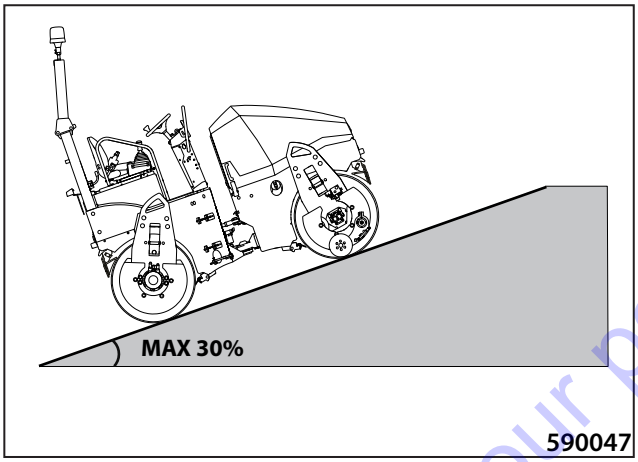
2.8.1 Loading the machine

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%.

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

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

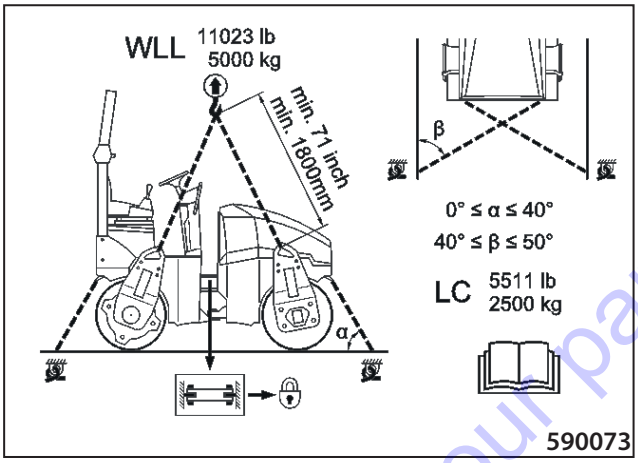
Pay increased attention when loading the machine. Improper handling can cause serious injury or death.

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

2.8.1.2 Loading the machine using a crane

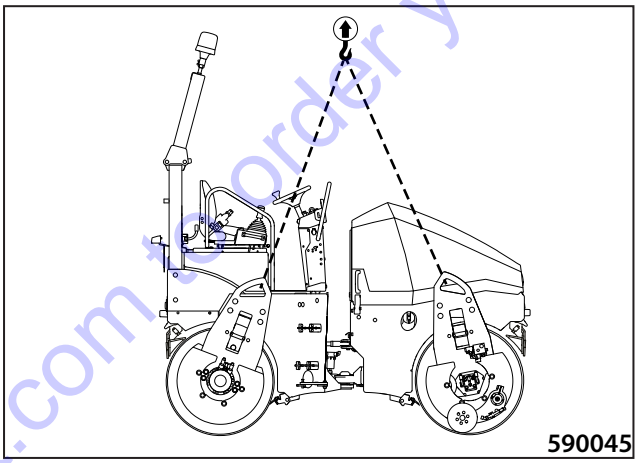
For loading with a crane, the machine is provided with a 4-point suspension.

Use a crane with a sufficient load capacity.



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

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



Observe safety regulations while loading and unloading!

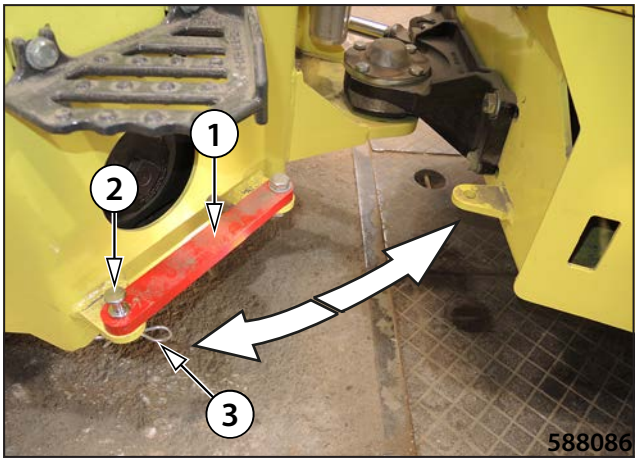
Use a crane with a sufficient load capacity!

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

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

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

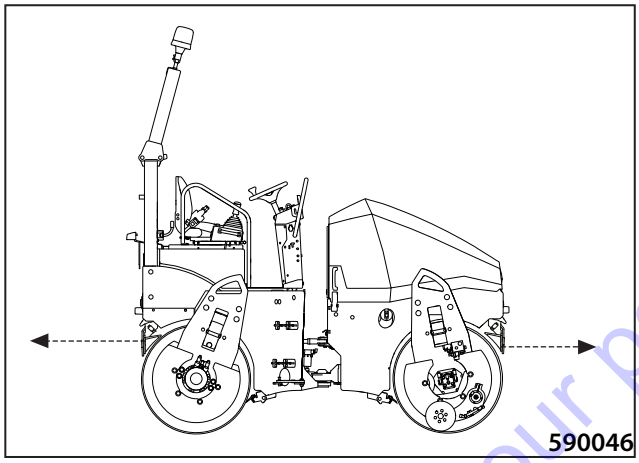
Do not enter under the lifted load!



2.9 Special conditions to use the machine

2.9.1 Towing the machine

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



Releasing the machine brake

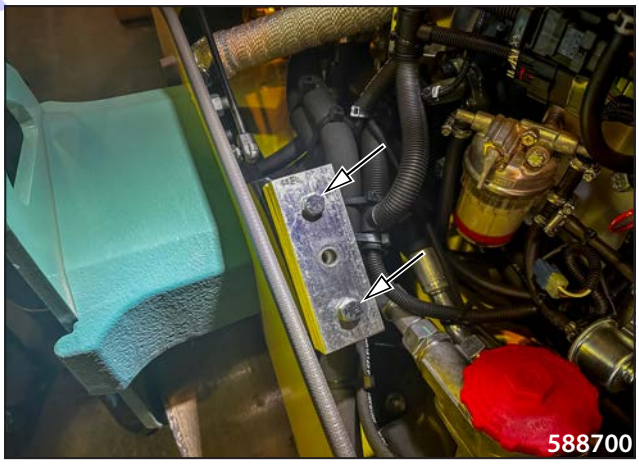
Secure the articulation joint of the machine against tilting.

Remove the brake discs.

Note

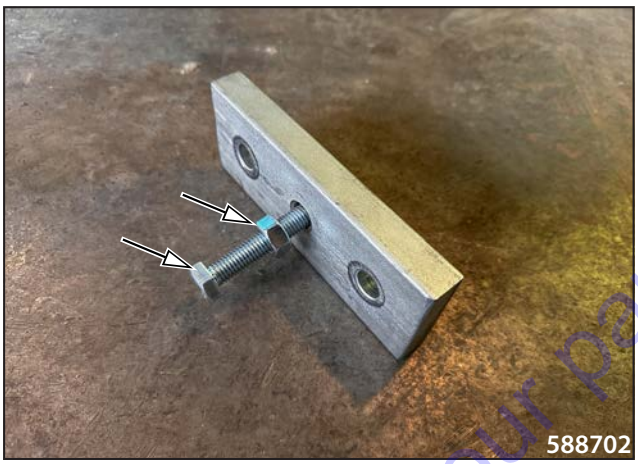
Brake pad dimensions 20x160x60

Screw M12X85



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

Insert the screw and nut into the brake pad.



Mount a brake disc on the front drum travel hydraulic motor.

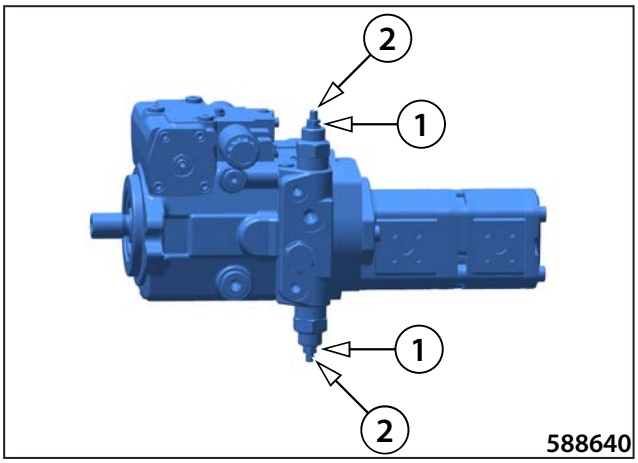
Tighten the screw to the stop (approx. by half a turn).

On the travel pump, loosen the lock nut (1) of the hydraulic valve and fully tighten the valve adjusting screw (2).

Note

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

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



2.9 Special conditions to use the machine

Towing procedure

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

The towed machine must be attached to both tow lugs.

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

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

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

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

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

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

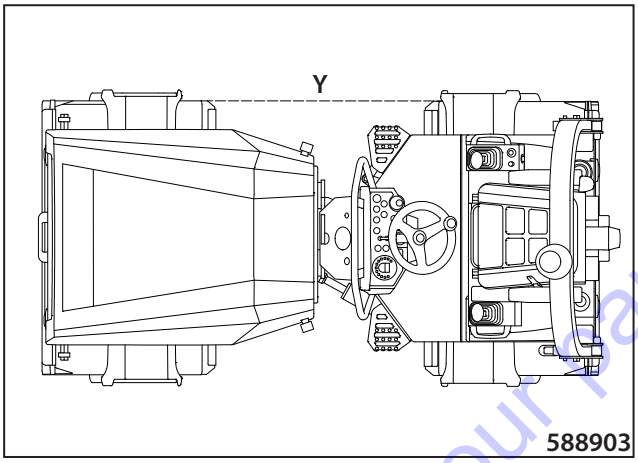
No person may stay on the towed machine!

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

2.9.2 Drum offset

In-line position (Y)

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

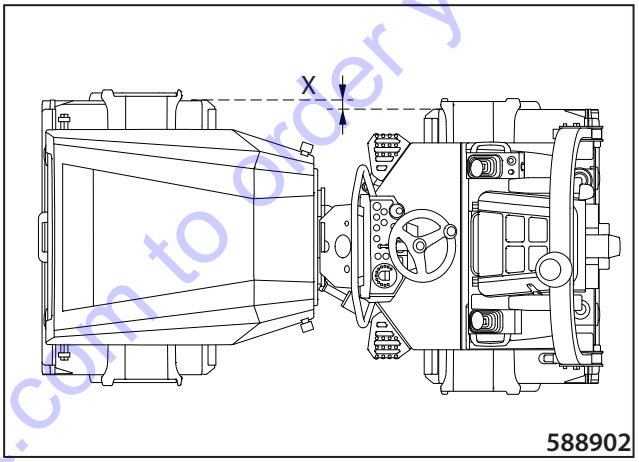


To adjust the drums from the offset position to the in-line position:

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

Offset position (X)

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



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

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

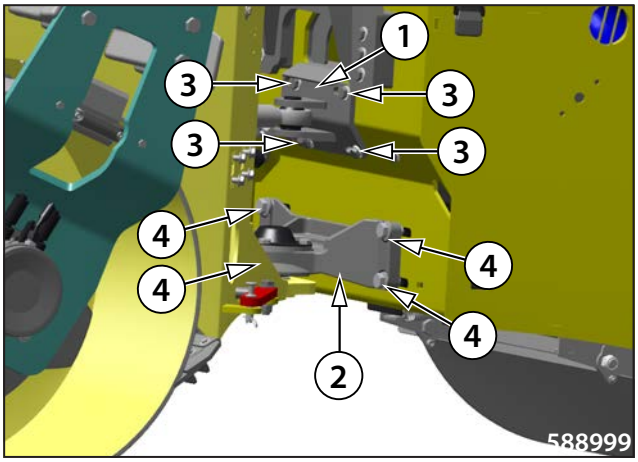
Danger of injury!

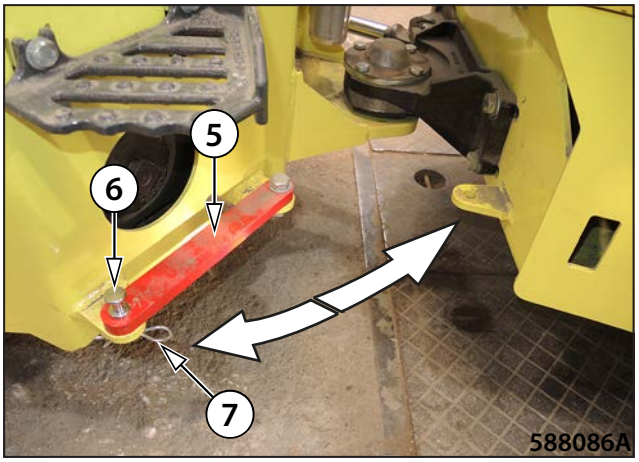
Carry out the drum offset when the engine is not running!

Lock the front and rear frame with the strut (5) in the joint area to prevent squeezing.

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

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





2.9.3 Machine operation during initial run period

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

2.9.4 Machine operation at low temperatures

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

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

Prepare the machine for operation at low temperatures:

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

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

2.9.5 Machine operation at higher temperatures and humidity

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

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

At outdoor temperatures when the hydraulic oil temperature is constantly about 90 °C (194 °F), we recommend you to replace the oil with the oil ISO VG 100 having the cinematic viscosity of 100 mm^2/s at 40 °C (104 °F).

2.9.6 Machine operation at higher altitudes

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

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

2.9.7 Machine operation in dusty environment

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

The recommended cleaning interval is once a week.

2.9.8 Driving with vibration on compacted and hard materials

When the machine works with vibration on hard materials (e.g. loose stony materials) or materials with a high degree of compaction, the drum can lose its contact with the compacted material (so-called vibro stroke). Due to this condition, the transfer of vibrations to the machine frame and to the 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.

3 MAINTENANCE MANUAL

ARX 36-2
ARX 40-2
ARX 45-2
(Kubota 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:

- charge only professionally trained personnel,
- according to safety instructions given in the Operating manual,
- in the intervals specified in the maintenance table. If the table contains two intervals of mandatory maintenance, e.g. every 1000 hours of operation or 1 year, always use the interval that occurs first.
- 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,
- on cold machine parts,
- after the machine, lubrication points and maintenance points have been cleaned
- using suitable, undamaged tools,
- by replacing parts with new original parts according to the spare parts catalogue,
- by providing sufficient lighting of the entire machine in case of poor visibility and at night
- by reinstalling all removed covers and safety elements after the work is completed
- retighten screw connections to the specified tightening torque and check the connections for leakage,
- after the operating fluids are heated – beware of burns – use only recommended media.

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

3.1.2 Fire protection when operating fluids are changed

- Considering the fire danger, the flammable liquids used on the machine are divided into the following hazard classes:

  II hazard class – diesel fuel

  IV hazard class IV – mineral oils, lubricating greases
- The oil change point must be where it cannot interfere in explosion or fire hazard areas.
- It must be identified by “No smoking” and “No open 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 in particular:
  - organic and synthetic lubricating materials, oils and fuels;
  - 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 according to

API (**A**MERICAN **P**ETROLEUM **I**NSTITUTE)

ACEA (**A**SSOCIATION DES **C**ONSTRUCTEURS **E**UROPÉENS D'**A**UTOMOBILE)

Viscosity classification

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

Use of permissible oils according to API: CJ-4

SAE 15W-40 year-round

Note

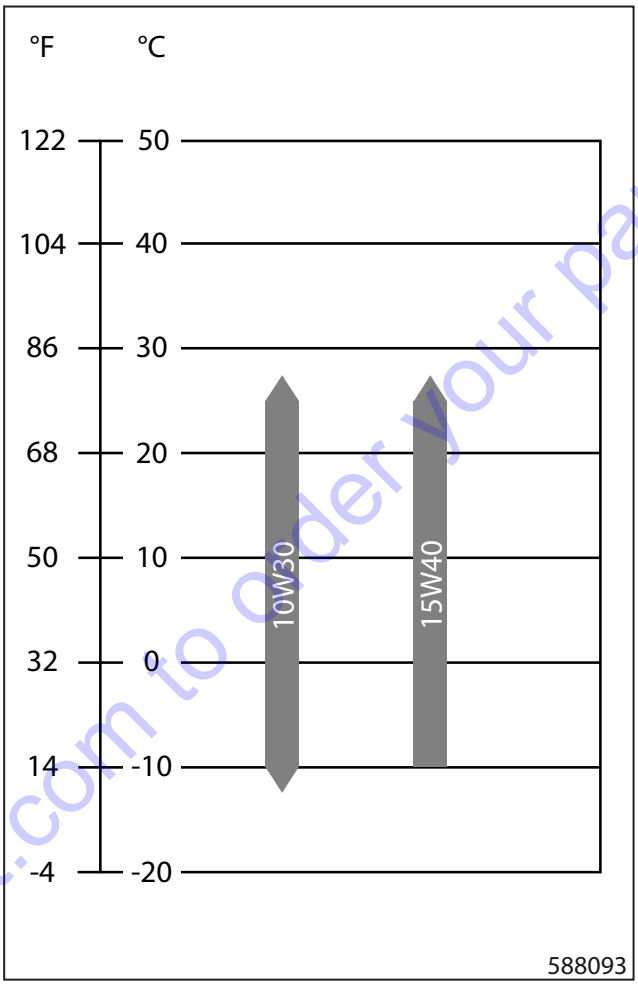
Exceeding the lower temperature limit does not result in damage to the engine; it can only cause some starting difficulties.

It is convenient to use universal multi-range oils to avoid the necessity of oil changes due to changes of ambient temperature.

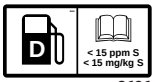
For easy starts at the temperatures below 0 °C (32 °F), the engine manufacturer recommends SAE 10W-30 oil.

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

Viscosity diagram



3.2.2 Fuel



3686

Diesel oil is used as fuel for the engine:

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

Note

Do not use fuels with a sulphur content exceeding 0.0015 percent by weight.

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:

- SAE J1034
- SAE J814c

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

Change the coolant every 2 years at the latest.

Note

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

It is a coolant based on monoethylene glycol containing silicates. Nitrite- amine- borate- and without phosphates.

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

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

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

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

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

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

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

Water quality

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

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

The maximum content of compounds of chlorine is 40 milligrams.

The maximum content of compounds of sulphur is 100 milligrams.

Safety instructions:

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

3.2.4 Hydraulic oil

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

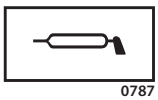
Fill the machines normally with hydraulic oil that has cinematic viscosity of 46 mm^2/s at 40 °C (104 °F) ISO VG 46. This oil is the most appropriate to be used within the widest range of ambient temperatures.

Synthetic hydraulic oil

The hydraulic system can be filled with synthetic oil, which if 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 Lubricating grease



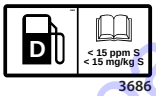
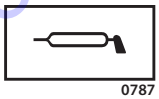
To lubricate the machine you must use plastic grease containing lithium according to:

ISO 6743/9 CCEB 2

DIN 51 502 KP2K-30

3.2.6 Emulsion

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

Part	Fluid type	Fluid quantity l (gal US)	Brand
Engine	Engine oil according to the chapter 3.2.1.	7 (1.9)	 2412
Fuel tank	Fuel according to the chapter 3.2.2.	57 (15.1)	 3686
Hydraulic system	Hydraulic oil according to the chapter 3.2.4.	53.5 (14.1)	 2158
Steering joint bearings, stirrup bearings, steering swivel pins, suspensions	Lubricating grease according to the chapter 3.2.5.	as required	 0787
Cooling system	Coolant according to the chapter 3.2.3.	7.3 (1.9)	 2152
Sprinkling tank	Water	340 (89.8)	 AMN59
Emulsion sprinkling tank	Emulsion according to the chapter 3.2.6	18 (4.8)	 AMN242

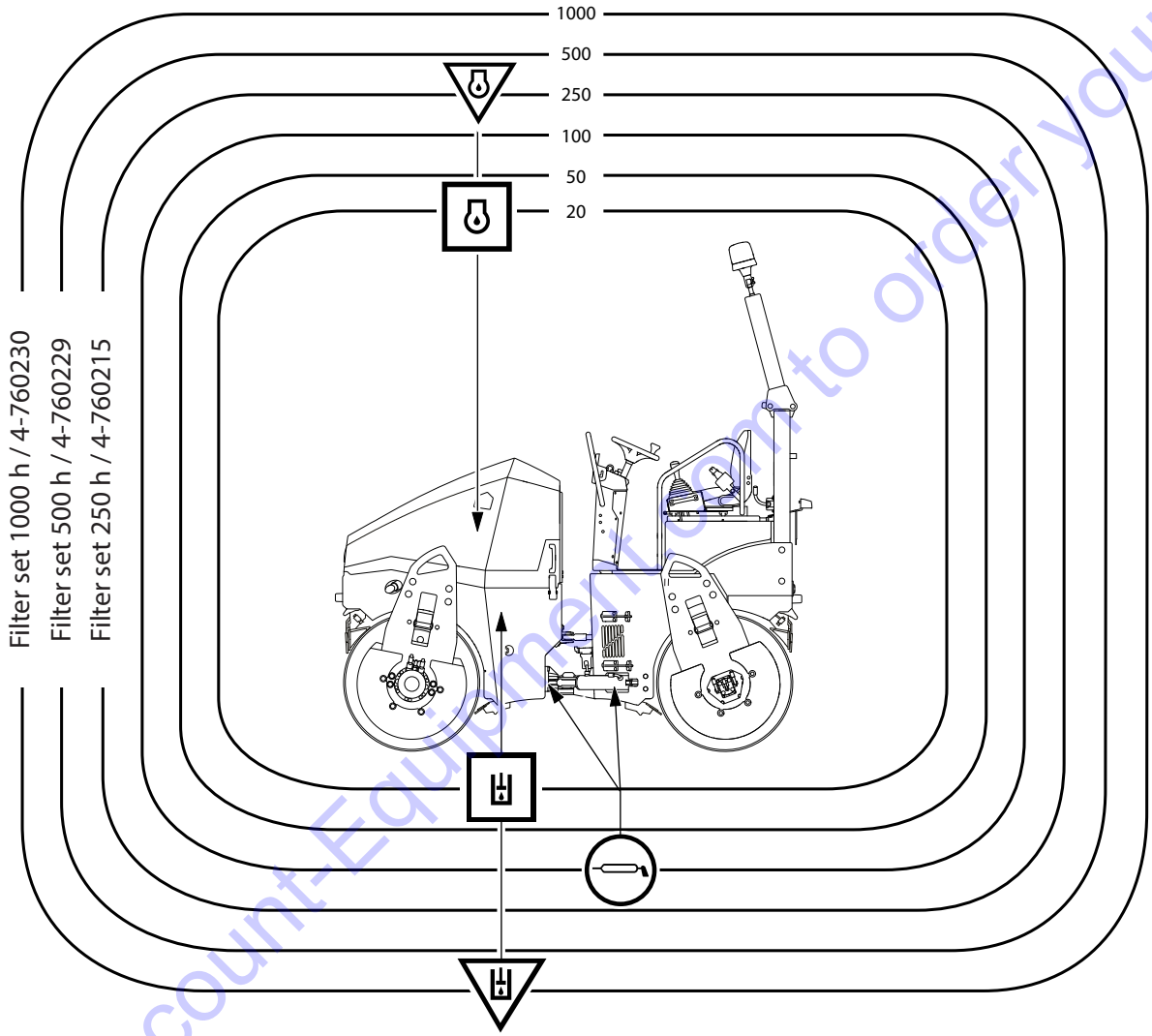
3.4 Lubrication and maintenance chart

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

Every 500 hours of operation, but at least once a year	
3.6.25	Fuel filter replacement
3.6.26	Electrical installation inspection
3.6.27	Air filter cartridges replacement
3.6.28	Replacement of the fuel separator filter
3.6.29	Check of rubber-metals of the engine cooler
Every 1,000 hours of operation	
3.6.30	Hydraulic oil change and filter replacement *
3.6.31	Damping system check
3.6.32	Swinging support check
3.6.33	Articulation joint check
3.6.34	Oil separator cartridge replacement
3.6.35	Fuel tank cleaning
3.6.36	Check and adjustment of valve clearances
Every 2000 hours of operation	
3.6.37	Engine coolant change
3.6.38	Engine belt replacement
Every 3000 hours of operation	
3.6.39	DPF replacement
3.6.40	Turbo-blower check
3.6.41	EGR valve check
Maintenance as required	
3.6.42	Gas strut replacement
3.6.43	Cleaning the water separator
3.6.44	Water tank cleaning
3.6.45	Machine cleaning
3.6.46	Draining water from the sprinkling circuit before the winter season
3.6.47	Fuel system venting
3.6.48	DPF clogging regeneration (Diesel Particulate Filter)
3.6.49	Rear-view mirrors
3.6.50	Charging of the battery
3.6.51	Tightening torques
*** First after 50 engine hours.**	

LUBRICATION AND SERVICE PLAN

□	INSPECTION
○	LUBRICATION
▽	REPLACEMENT



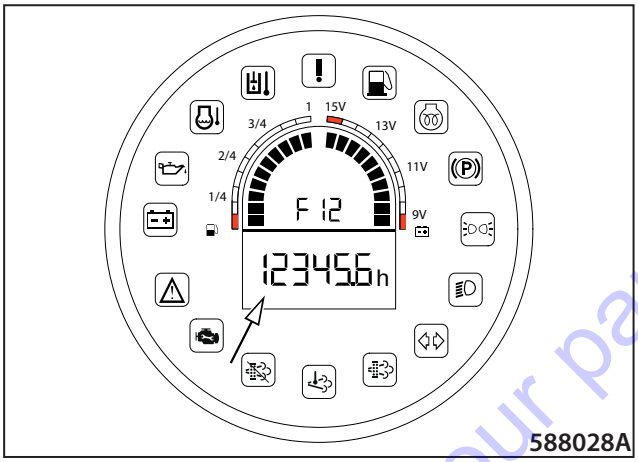
	Engine oil:	**SAE 15W/40**	**API CJ-4**
	Hydraulic oil:	**ISO VG 46 HVLP**	
	Lubricating grease:	**ISO 6743/9**	**DIN 51 502**

590A075

3.6 Lubrication and maintenance operations

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

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



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

Observe instructions specified in the operation and maintenance manual!

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

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

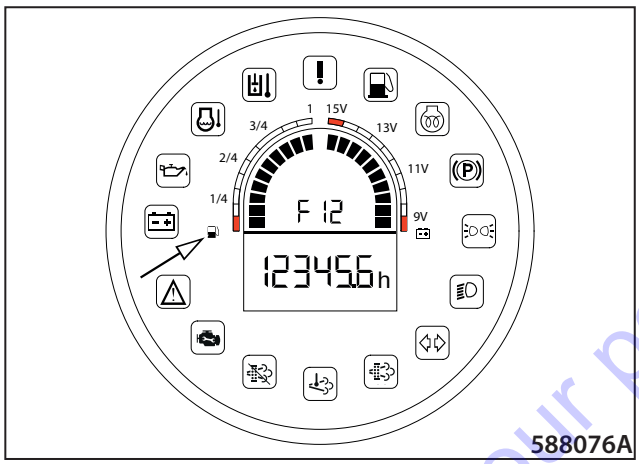
After the first 50 hours of operation of the new machine or after its general overhaul, carry out the following operations according to Chapter:

3.6.22	**Engine oil change**
3.6.30	**Hydraulic oil change and filter replacement**

Every 20 hours of operation (daily)

3.6.1 Fuel check

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



588076A

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

588038

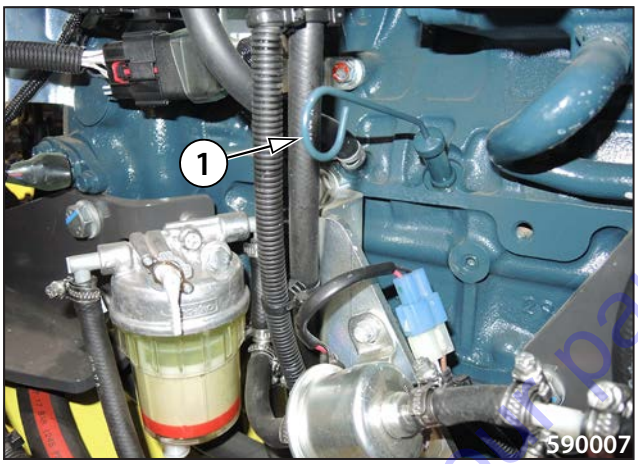
Note
The fuel tank volume is 57 l (15.1 gal US).

Refill the same oil grade; see the chapter 3.2.2.
Check the fuel tank and the fuel circuit for leaks.

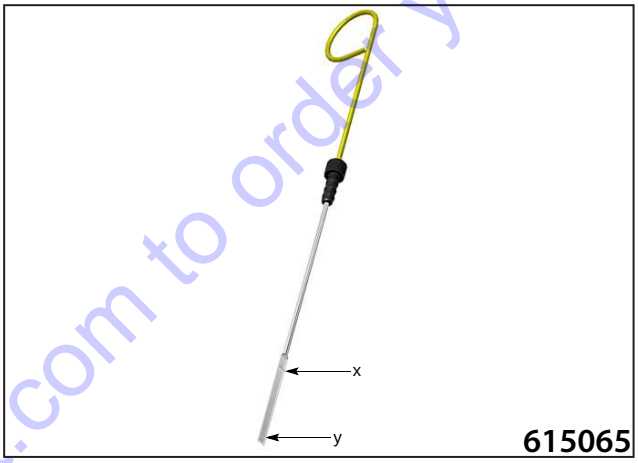
Do not smoke and do not use open fire when working!
Do not refill the fuel when the engine is running.

Stop the fuel soaking into the ground.

3.6.2 Checking the oil in the engine



- Wait for about 5 min. until the oil flows down into the engine sump.
- Take out the oil dipstick, wipe it, insert fully back and take it out again to read out the oil level.

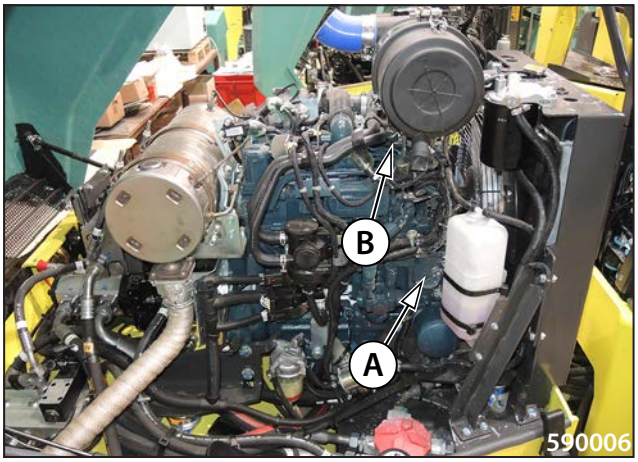


- Keep the level within the range of gauge marks imprinted in the dipstick. The lower mark shows the lowest possible oil level, the upper mark indicates the highest.

- Refill the oil as required.
- Refill the engine oil into one of the two filler necks:
  - filler neck on the left side of the engine (A),
  - filler neck on the engine (B).
- Check the engine for leaks and remove the cause.
- Check the engine for damaged and/or missing parts and for changes in appearance.

Note

The total volume of oil in the engine is 7 l (1.9 gal US).



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

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

Refill only oil of the same grade according to the chapter 3.2.1

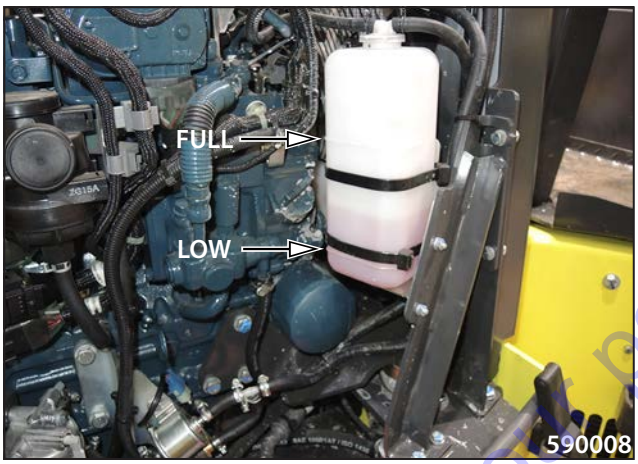
Stop the oil soaking into the ground.

3.6.3 Engine coolant check

- Let the coolant cool below 50 °C (120 °F).
- Do visual inspection of the level on the expansion tank. The fluid level must be between the upper (MAX) and the lower (MIN) mark.
- Refill the coolant as required. Carry out the refilling through the filler neck.

Note

The total volume of coolant in the engine is7.3 l (1.9 US gal).



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

The level must not drop below the lower mark.

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

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

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

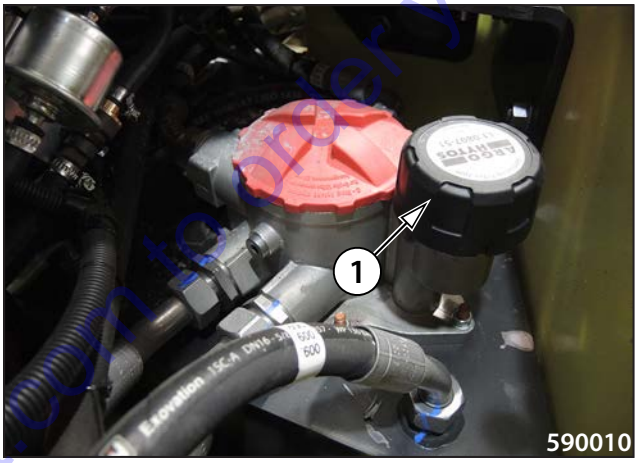
In case of larger losses, find out where the cooling system leaks and repair the cause.

3.6.4 Checking the oil in the hydraulic tank

- Check the hydraulic oil level always when the engine is cold but running.
- Put the machine on a flat terrain.
- Let the engine run at idle.
- Check the oil level in the inspection hole.
- The ideal oil level is when the gauge is half-full.

Hydraulic oil refilling

- Take off the ventilation filter (1) from the filler neck.
- Refill the required quantity of hydraulic oil.
- Screw in the ventilation filter (1) back in place.



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

Check the oil when it is cooled down.

Refill only oil of the same grade according to the chapter 3.2.4

Stop the oil soaking into the ground.

3.6.5 Cleaning the hydraulic oil cooler

- Check the cooling fins that they are not dirty or clogged.
- Clean the fins with water or blow through with compressed air.
- When working in a very dusty environment, carry out the cleaning daily. The cooler clogging results in reduced cooling effect and increased temperatures of the engine coolant and hydraulic oil.

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

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

Do not smoke while working!

Check the hydraulic circuit for leakage.

Follow environmental standards and regulations when cleaning the machine!

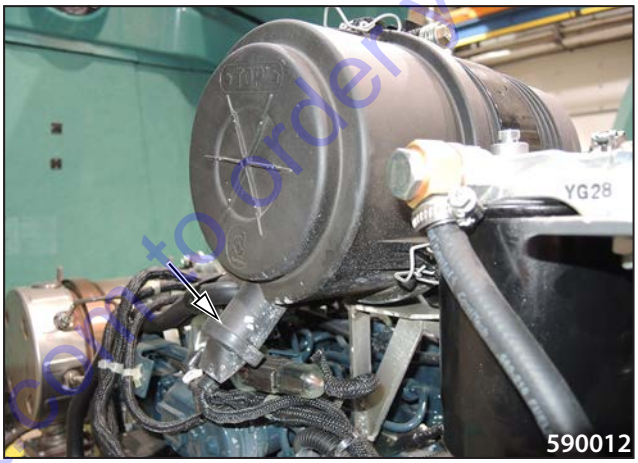
Clean the machine in a workplace equipped with a catching system of cleaning agents to avoid contamination of the soil and water!

Do not use forbidden cleaning agents!

3.6.6 Air filter check

- Check that the suction hole is not dirty.

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



Note

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

Replace the dust valve immediately if it is damaged!

3.6.7 Check of the sprinkling emulsion level

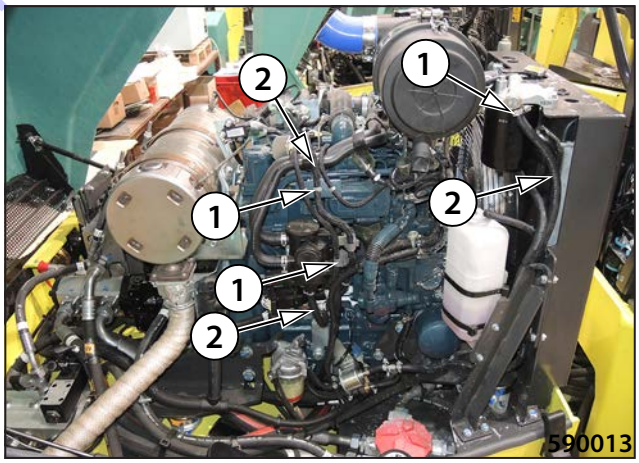
- Open the lid.
- Remove the tank cap.
- Refill the emulsion.

Refill only emulsion of the same grade according to the chapter 3.2.6

Stop the emulsion soaking into the ground.

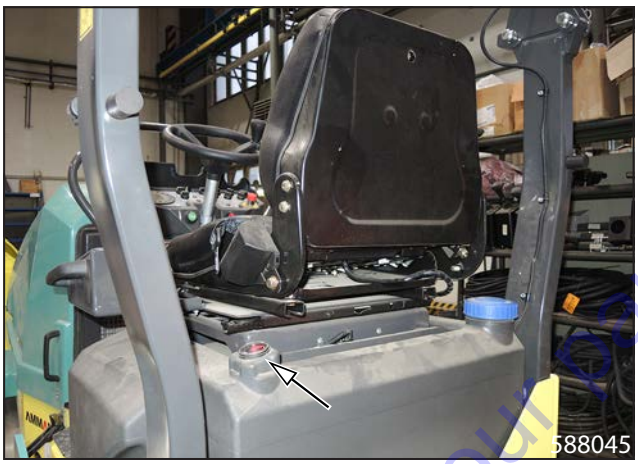
3.6.8 Check of hoses and clips

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



3.6.9 Sprinkling tank refilling

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



- Open the tank cap and refill with clean water.

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

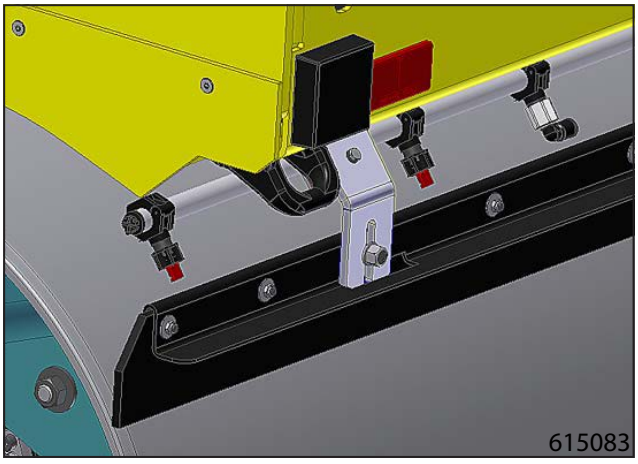
3.6.10 Scraper adjustment

Fixed scrapers (optional equipment)

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

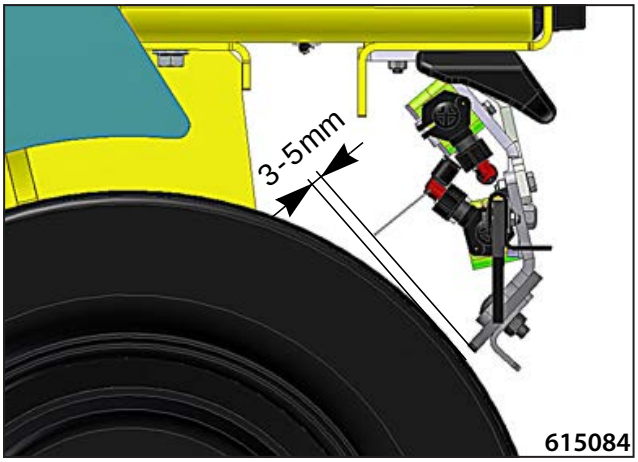
Hinged scrapers (optional equipment)

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



Scrapers for the wheel axle

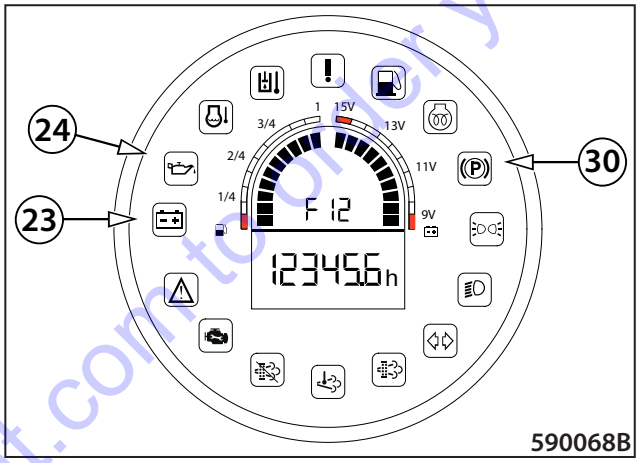
- Adjust the tyre scrapers so that there is a gap of 3–5 mm between the scraper and the tyre.
- Never wipe off the emulsion.



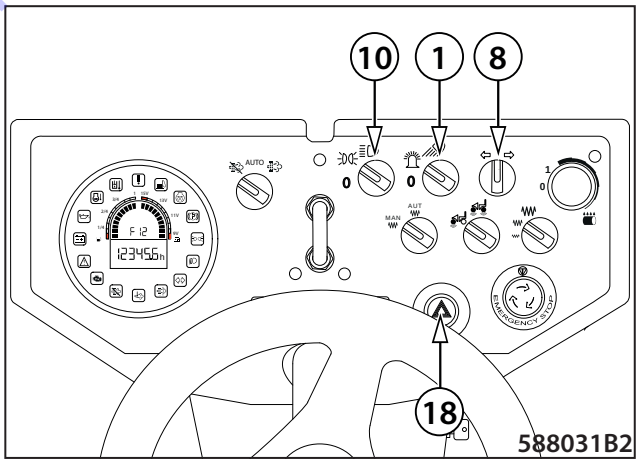
3.6.11 Check of warning and checking devices

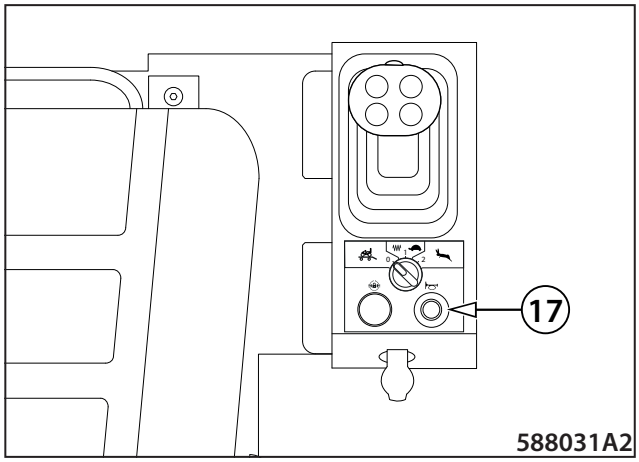
- Turn the key in the ignition box to the position I.

- The indicator lamps for battery charging (23), engine lubrication (24) and parking brake (30) will light up.

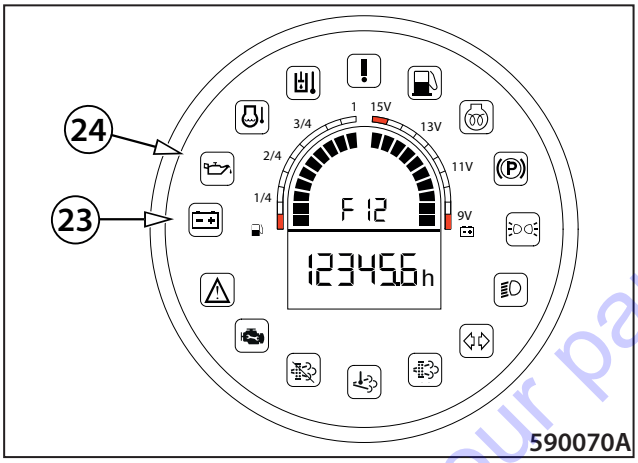


- Then check the switches (1, 8, 10, 17, 18) for operation.





- Start the engine according to Chapter 2.7.1.
- After the start, the indicator lamps for battery charging (23) and engine lubrication (24) must go off.

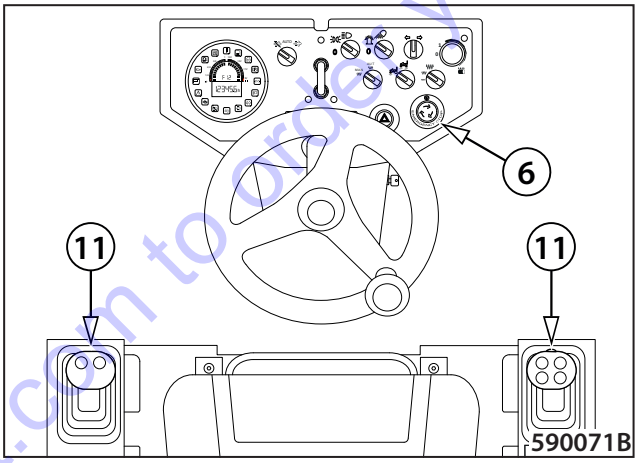


Move off the machine:

- After the travel control (11) is moved through the neutral position "N", the brake indicator lamp (30) goes out.

Emergency brake button function:

- Let the machine stay on the spot and set the travel control to the neutral position (N).
- Press the emergency brake button (6).
- The brake is enabled and the engine stalls.
- The emergency stop indicator lamp (27) and the parking brake indicator lamp (30) light up.
- Turn the emergency brake button (6) in the direction of arrows.
- Set the travel control (11) to the brake position (P). Move the key in the ignition box to the "0" position.
- Now you can start the engine again.

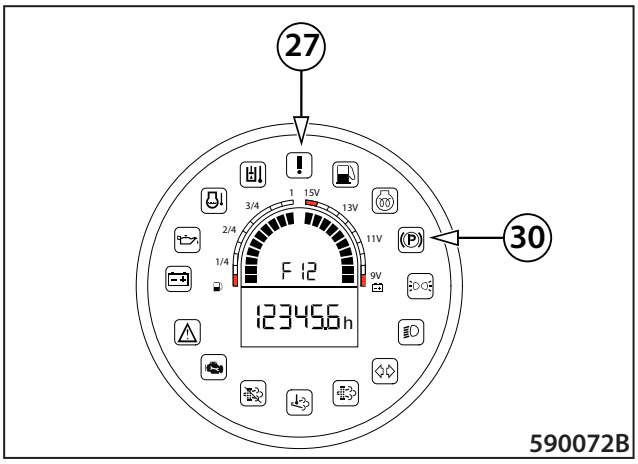


Use the audible alarm to announce the engine start!

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

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

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

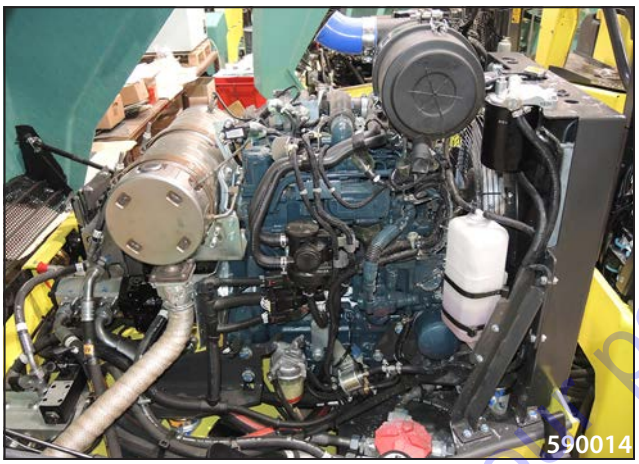


During operation, check the instruments and indicator lamps continuously.

Promptly repair any failures!

3.6.12 Engine tightness check

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



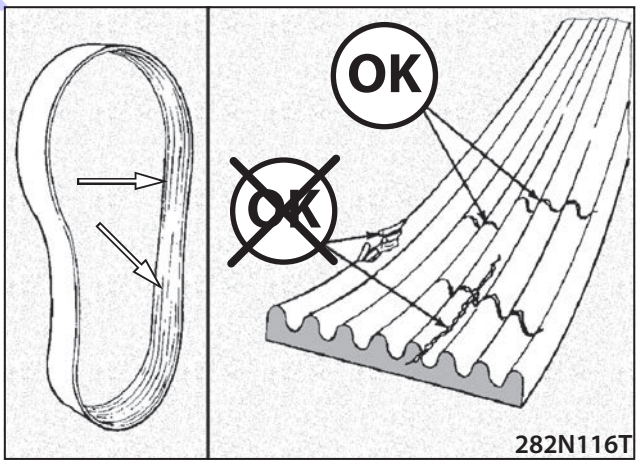
3.6.13 Checking the fan and engine belt for condition

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

Fan
Order number: 1448212

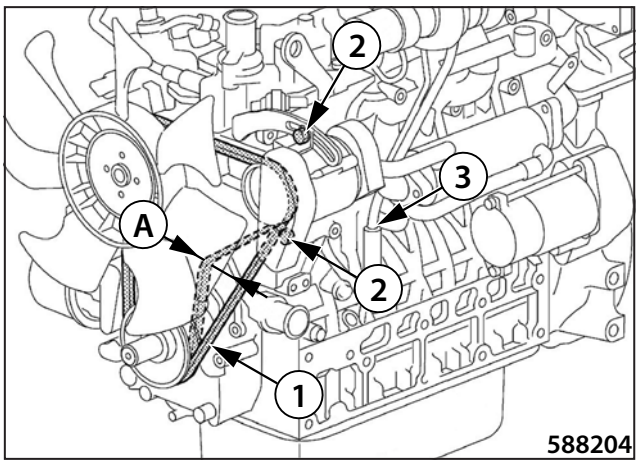
Belt wear check

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



Belt tension check

- Press with your thumb at the spot where the belt length between the pulleys is the longest, use the force of 98 N (22 lb). The max. slack (A) is 7–9 mm (0.28–0.35 in).
- Tighten the belt (1) by loosening the screws (2) and shifting the alternator (3) if required.
- Check the belt for correct tension.



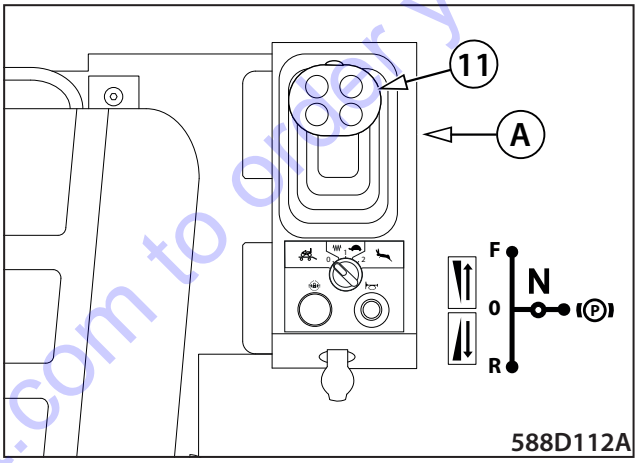
3.6.14 Brake test

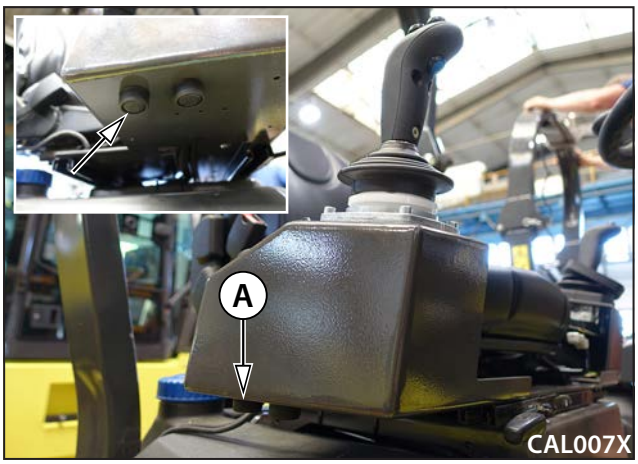
3.6.14.1 Check of the parking brake

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

Perform the test on a level and solid surface.

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





Procedure

- Place the machine on a flat and solid surface.
- Sit in the driver's position and start the engine according to Chapter 2.7.1.
- The travel control (11) must be in the parking brake position "P".
- Switch to the "Brake test" mode by pressing the brake test button (A) for 5 seconds. While the button is held down, the display shows the "btn br" status.
- After 5 seconds, the display shows the "br tSt" status.
- Start the test by setting the travel control to the forward travel position.
  - The machine must not move off. If the machine moves off, the test is unsuccessful – the machine stops by itself after 3 seconds or it can be stopped by moving the travel control (11) to any position except for the forward position.
- The test can be interrupted prematurely by moving the lever anywhere out of the forward position. This stops the traction force. The machine is still in the "Brake test" mode.
- For normal operation or to repeat the brake test, stop the "Brake test" mode by moving the travel control (11) back to the parking brake position "P".
- To repeat the test, follow the steps above to start the "Brake test" mode.
- After an unsuccessful brake test, secure the machine against spontaneous movement by wedges and contact service.

3.6.14.2 Check of the emergency brake

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

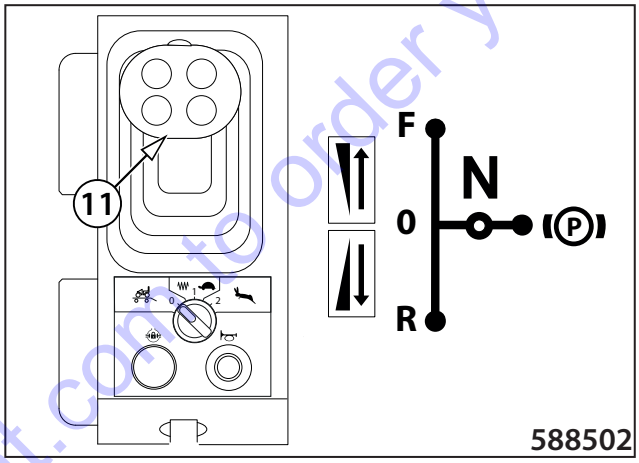
Check that the area in front of and behind the machine is empty and that there are no persons or obstacles there! Ensure a suitable safe distance in front of the machine, behind the machine as well as on its sides.

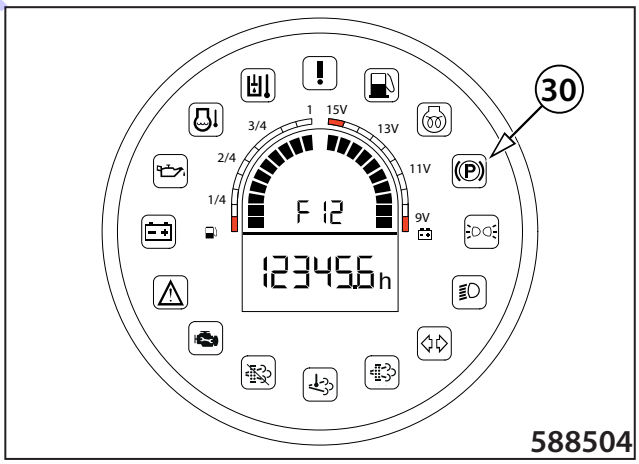
Procedure

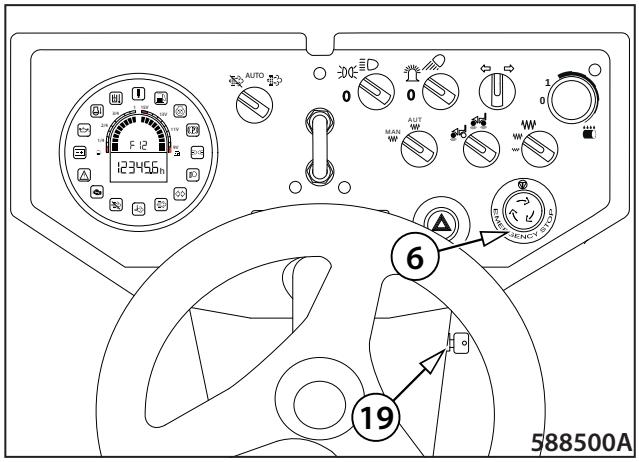
- Place the machine on a flat and solid surface.
- Sit in the driver's position and start the engine according to Chapter 2.7.1.
- Set the travel control (11) to the neutral position "N".
- The parking brake indicator lamp (30) goes off.
- The machine is unbraked.
- Press the emergency brake button (6). The engine stops and the parking brake indicator lamp (30) lights up.
- If the engine does not shut down, turn it off using the key in the ignition box, secure the machine against spontaneous movement using wedges on a level and solid surface and contact service.

Note:

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

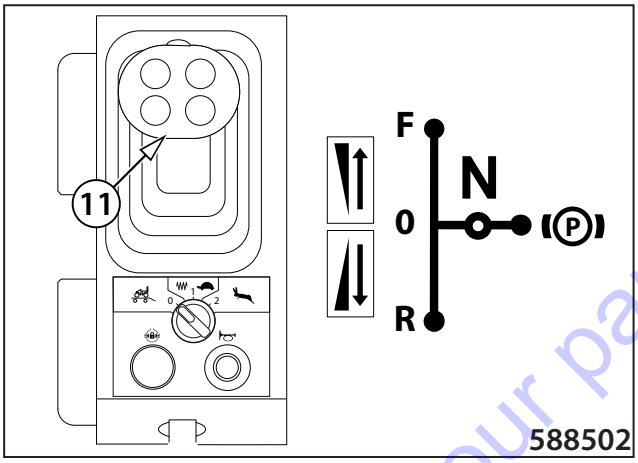






3.6.14.3 Check of the service brake

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



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

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

Procedure

- Place the machine on a flat and solid surface.
- Sit in the driver's position and start the engine according to Chapter 2.7.1.
- Move off by setting the travel control (11) to the forward travel position "F".
- Set the travel control to the neutral position "N".
- The machine will stop and the parking brake will not activate.
- To move off again or control the brake during braking, move the travel control (11) back to the forward travel position "F".
- If the machine does not stop, activate the emergency brake, secure the machine against spontaneous movement using wedges on a level and solid surface and contact service.

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

3.6.15 Check of the tightness of the fuel and hydraulic system

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

Every 50 hours of operation

3.6.16 Battery check

- Stop the engine.
- Clean the surface of batteries.
- Check the condition of the terminals and clamps. Clean the terminals and clamps. Apply a thin layer of grease on the terminals.

MAINTENANCE-FREE BATTERY

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

Note

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

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

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

Hand over the old inoperative battery for disposal.

Keep the battery dry and clean.

Do not disconnect the battery when the engine is running.

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

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

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

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

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

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

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

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

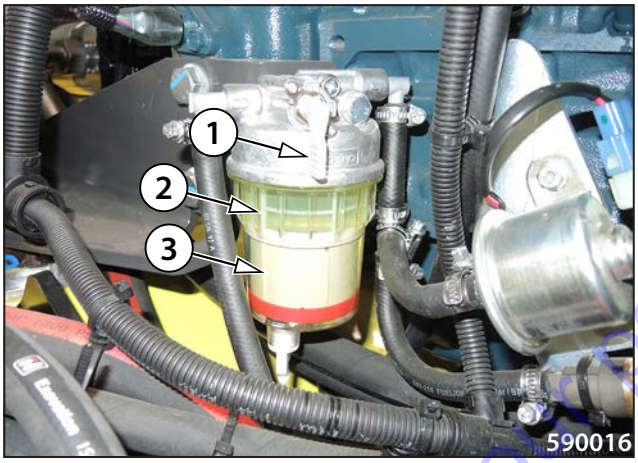
Do not eat, drink, smoke while working!

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

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

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

3.6.17 Cleaning the water separator on the fuel filter



- If the red ring goes up from the bottom, drain the water from the separator.
- Close the stop cock (1).
- Unscrew the filter housing (2).
- Clean the filter element (3).
- Screw in the filter housing back (2)
- Open the stop cock (1).
- Turn the ignition on. The fuel pump will vent the system automatically.

Fuel filter cartridge
Order number: 1503944

Do not smoke while working!
Check the water separator for leaks.

Stop the fluid soaking into the ground.

Every 100 hours of operation

3.6.18 Machine lubrication

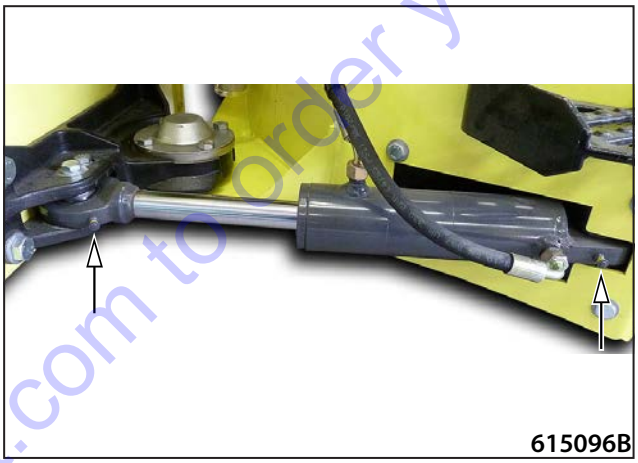
- Remove the caps on the grease nipples.
- Before lubricating, clean the grease nipple.
- Connect the grease gun to the grease nipple.
- Lubricate the bearing sufficiently until the lubricant starts to flow out.
- Install the protective cover in place.

Note

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

Steering linear hydraulic motor

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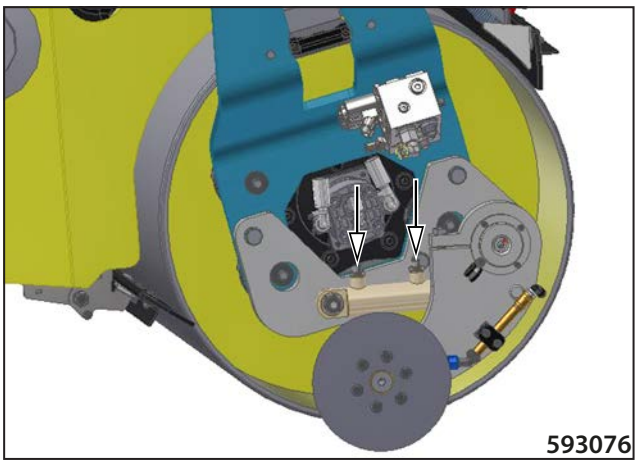
Edge cutter

Pins 2×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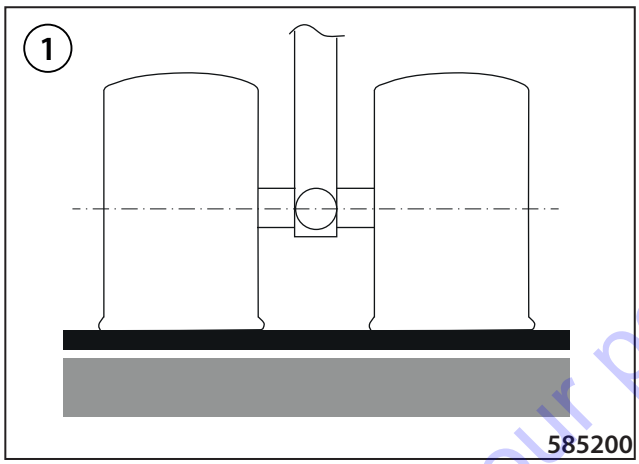
3.6.19 Tyre pressure check

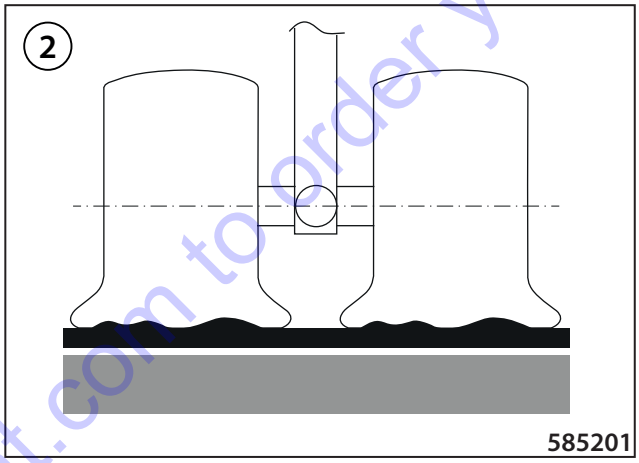
On combined rollers, check the tyre pressure with a tyre pressure gauge and adjust if necessary. The pressure is factory-set to 1 bar as standard.

The tyre pressure must be adjusted to the degree of soil compaction.

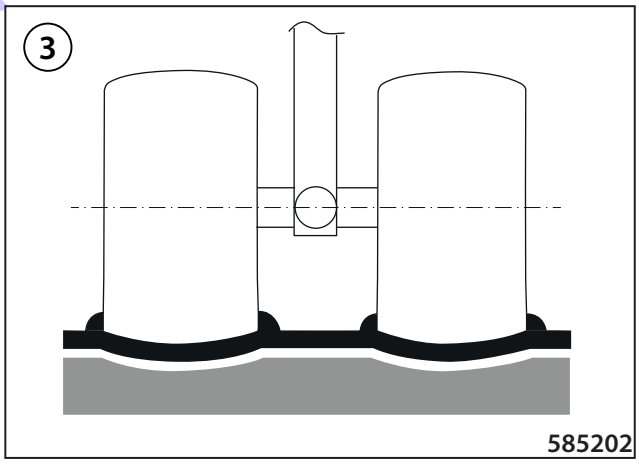
- Tyre pressure OK (1)



- Tyre pressure too low (2)



- Tyre pressure too high (3)



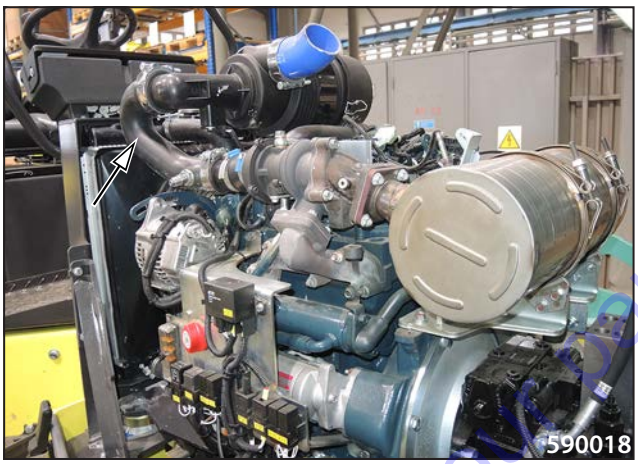
Pay attention to the equal pressure in all of the tyres.

When fabric is visible on the tyre surface, the tyres must be replaced.

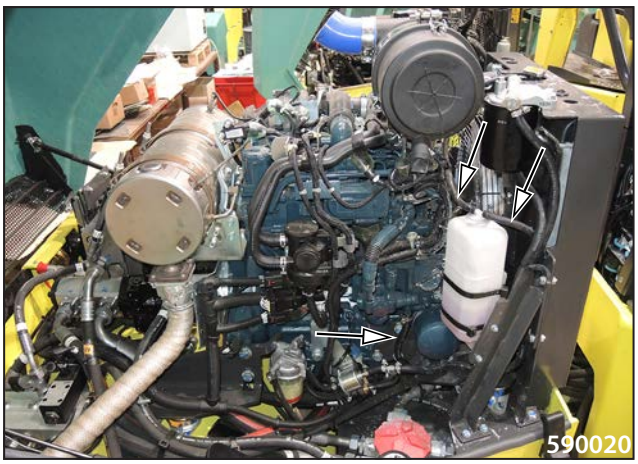
Every 250 hours of operation

3.6.20 Checking the hoses and clips for mounting

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



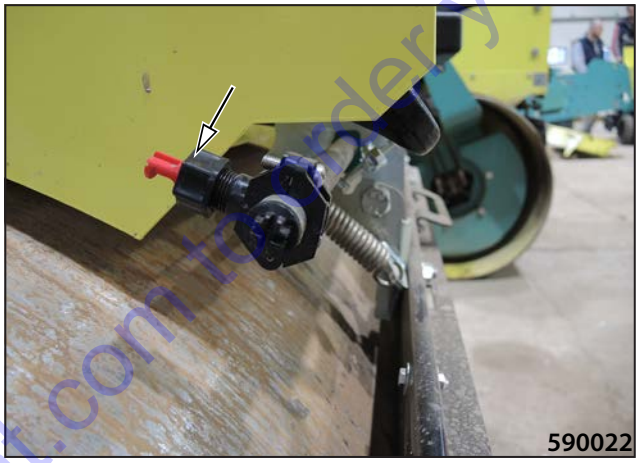
- Check the cooling circuit for leakage. Check the hoses for damage and missing hose clips. When hoses are cracked or hardened, replace them for new ones.

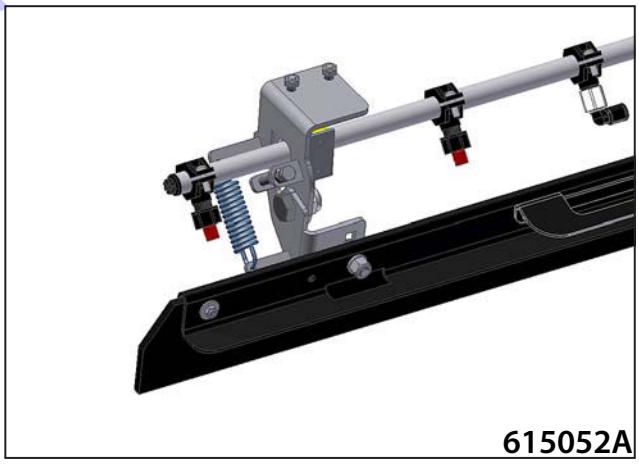


3.6.21 Sprinkling filter cleaning

- Remove the sprinkling filter vessel, remove the sieve, clean it and mount back.
- Check the seal.
- Replace if damaged.

- Remove and clean the sprinkler sieves.





3.6.22 Engine oil change

Check for the first time after 50 hours.

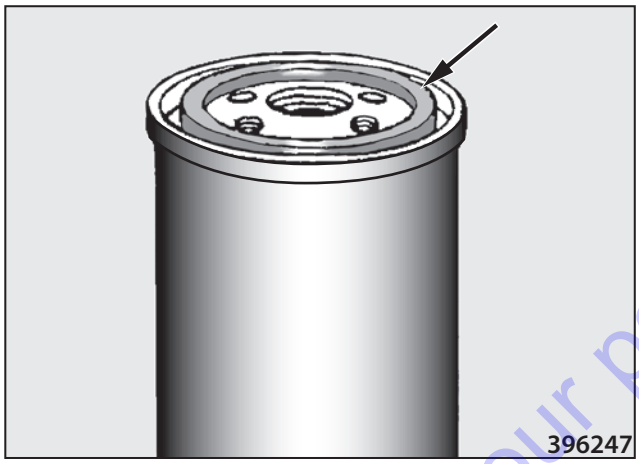
Drain the oil after the operation is finished immediately after the coolant has been cold down to 60 °C (140 °F), or warm up the engine during operation until the coolant temperature reaches 60 °C (140 °F).

- The engine oil drain plug is on the left side in front between the front and rear frame of the machine.
- Turn the machine to the right to get better access to the drain plug.
- The total volume of oil in the engine is 7 l (1.85 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. Remove the filter. Clean the seating surface for the filter gasket.

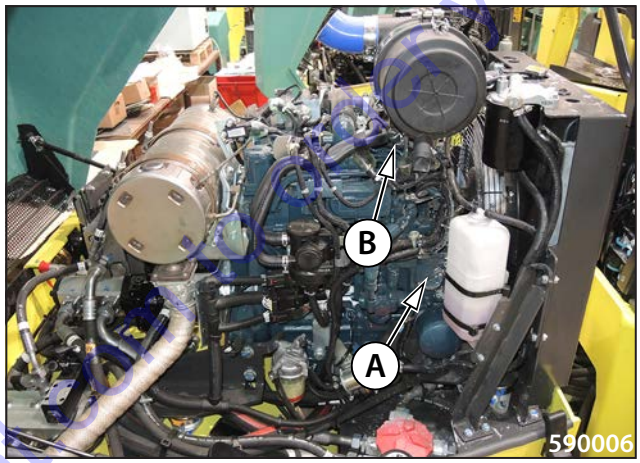
- Lubricate the gasket with oil.
- Mount the new filter.

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



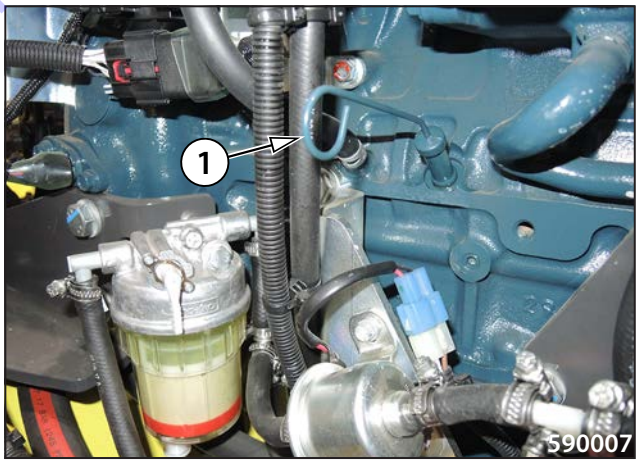
Engine oil filter
Order number: 1504183

- Refill the engine oil into one of the two filler necks.
  - Filler neck on the left side of the engine (A)
  - Filler neck on the engine (B)



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

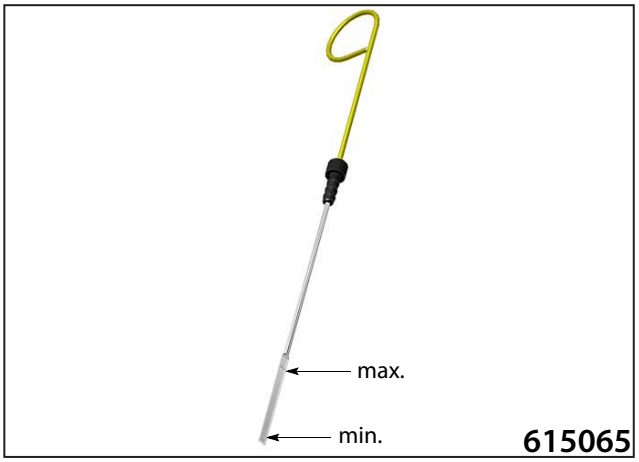
- Refill the oil to the upper oil level mark (1). The oil volume is 6.8 l (1.8 gal US) including the oil filter volume.



Note

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

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



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

- During the regeneration process, the engine oil can be diluted by the fuel. It can cause that the engine oil quantity will increase. If the engine oil level is above the upper level mark, change the oil.
- If the DPF regeneration interval is shorter than 5 hours, replace the oil.

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.

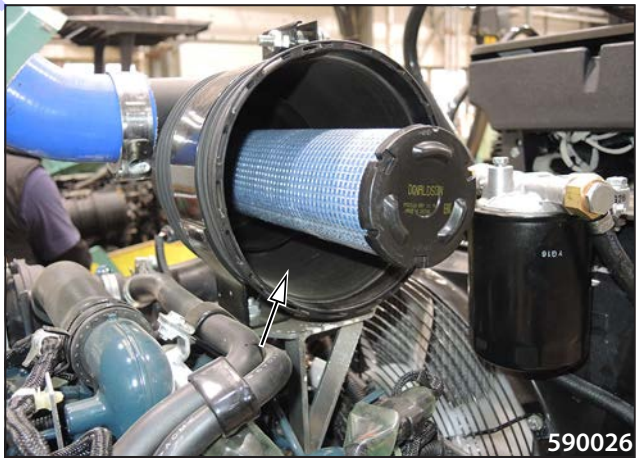
3.6.23 Checking the hoses of the engine cooler for wear and mounting

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

3.6.24 Air filter cleaning

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

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

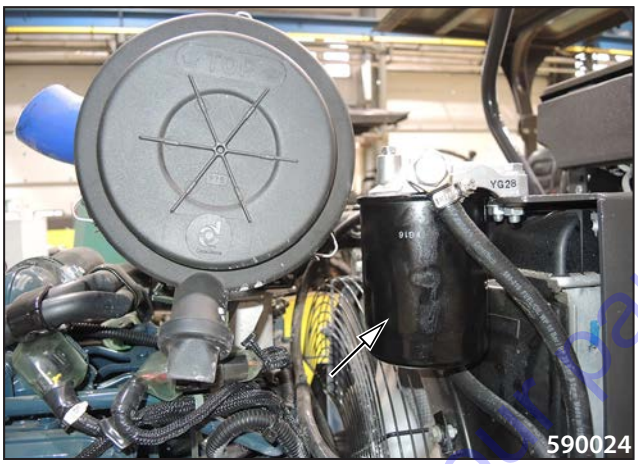


Never use compressed air to clean the filter interior.

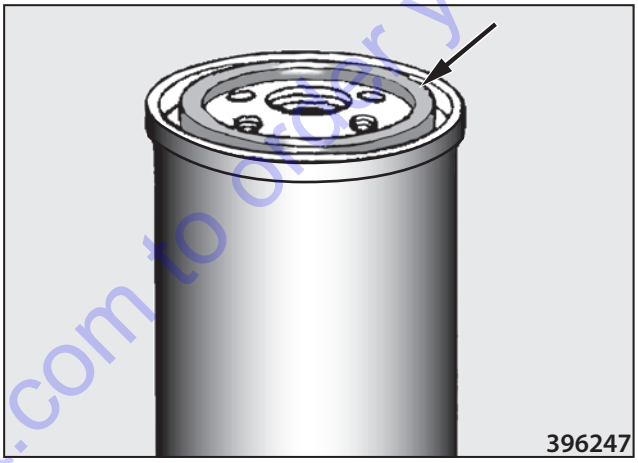
Every 500 hours of operation, but at least once a year

3.6.25 Fuel filter replacement

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



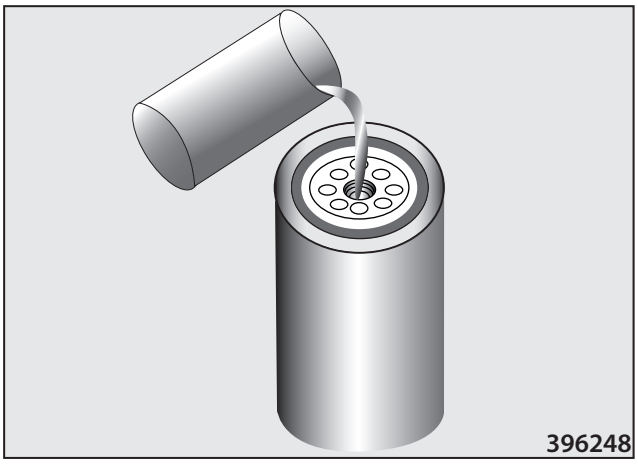
- Lubricate the seal rings of the new filters with oil.



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

Fuel filter
Order number: 1503943

Use original specified filters.
Do NOT tighten the filters with force!



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

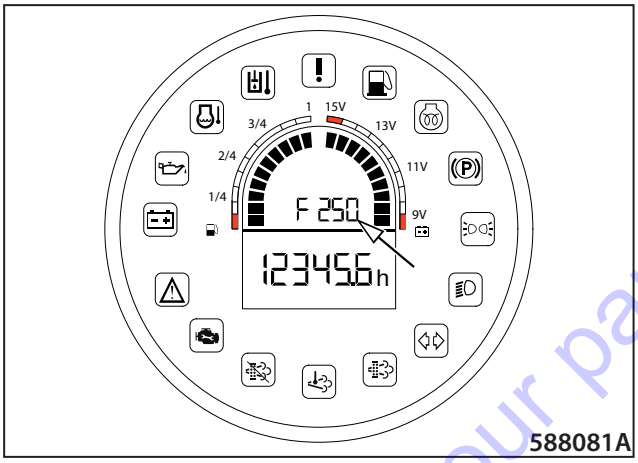
Catch the drained fuel.
Store used filters in a separate container and hand them over for disposal.

3.6.26 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 cartridges of the air filter

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



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The manufacturer does not recommend you to clean the cartridges because there is a possibility of reducing the capacity by up to 40% and damaging the cartridge during the cleaning.


590027

- Remove the filter cap.

- Take out the main cartridge.

Air filter cartridge, external
Order number: 1503942


590028

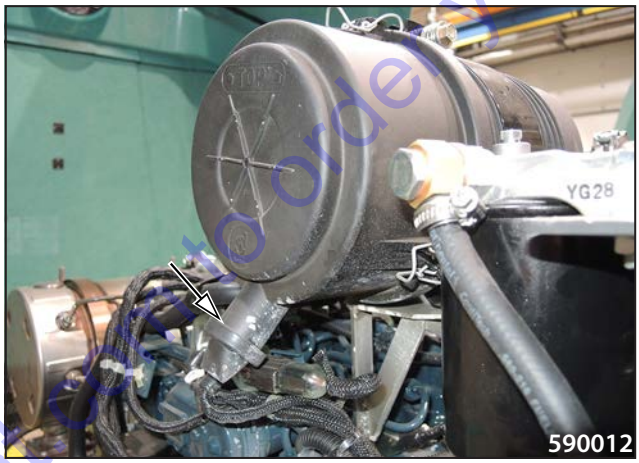
- Take out the safety cartridge.
- Replace the safety cartridge after every third replacement of the main cartridge.

Air filter cartridge, internal
Order number: 1503941


590032

- Clean the internal area of the filter and of the contact surface so that no dust is taken into the inner supply piping towards the engine.
- Insert the new safety cartridge.
- Insert the new main cartridge. Check that both cartridges are mounted correctly and are sealing.

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



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

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

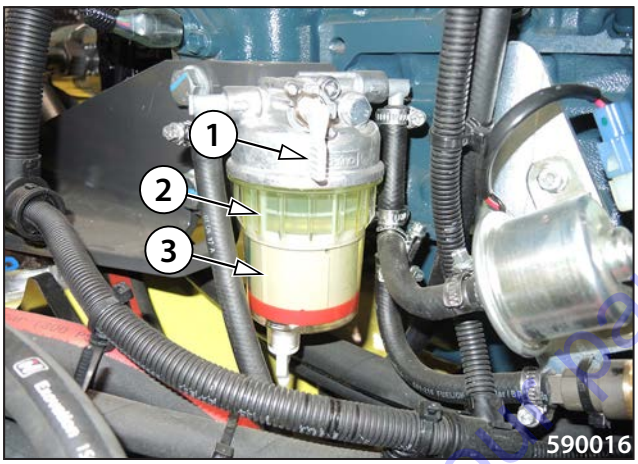
Use original cartridges, only.

Take care not to splash water into the air filter.

Replace the dust valve immediately if it is damaged!

NEVER operate the Machine with filter body or lid damaged.

3.6.28 Replacement of the fuel separator filter



- If the red ring goes up from the bottom, drain the water from the separator.
  - Close the stop valve (1).
  - Unscrew the filter housing (2).
  - Replace the filter element (3).
  - Refit the filter housing (2).
  - Open the stop valve (1).
  - Turn the ignition on. The fuel pump will vent the system automatically.

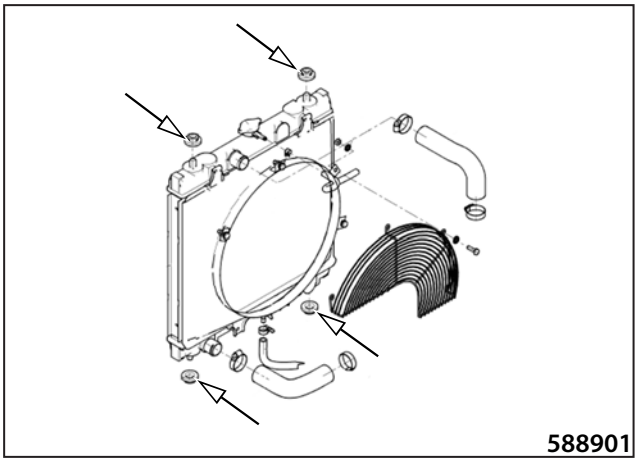
Fuel filter cartridge
Order number: 1503944

Do not smoke while working!
Check the water separator for leaks.

Stop the fluid soaking into the ground.

3.6.29 Check of rubber-metals of the engine cooler

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



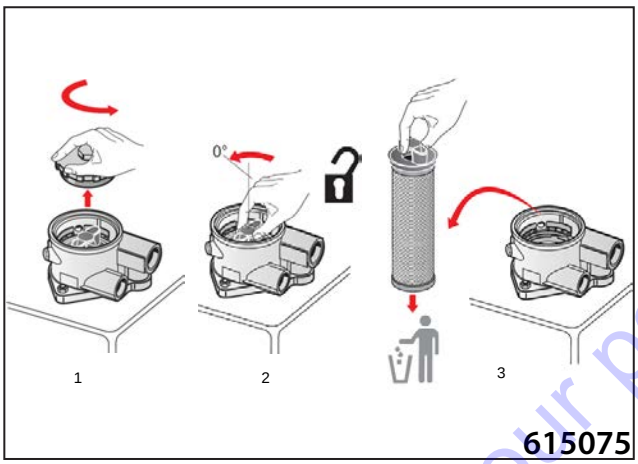
Replace if damaged.
Recheck screws and nuts for tightening.

Drum rubber-metal
Order number 1448304

Every 1,000 hours of operation

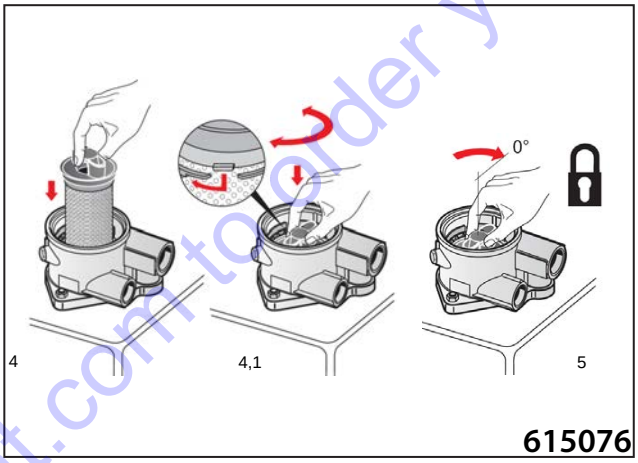
3.6.30 Hydraulic oil change and filter replacement

Check for the first time after 50 hours.



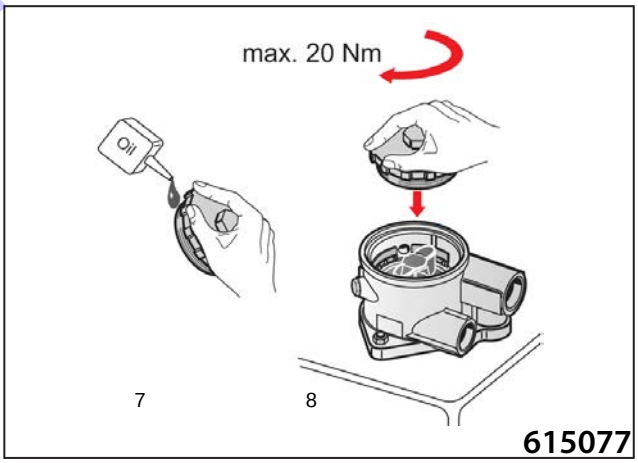
Hydraulic oil filter replacement

- Take off the filter cap.
- Unlock the filter cartridge.
- Pull out the filter cartridge from the filter housing.
- Dispose of the filter cartridge environmentally.
- Insert the new filter cartridge in the correct place. Keep the position of the safety cam.
- Turn the filter cartridge clockwise up to the stop.
- Oil the sealing ring on the filter cap slightly.
- Put the filter cap in place.
- Tighten the cap with the torque spanner (max. torque 20 Nm).



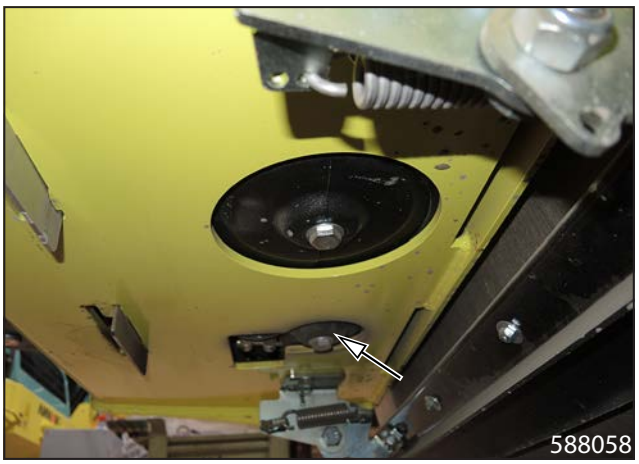
Hydraulic filter cartridge
Order number: 3-51629

Hydraulic oil draining



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

- Place a vessel under the hydraulic oil drain plug. Oil charge is 46.5 l (12.3 gal US).
- Take out the ventilation filter.
- Remove the plug from the hydraulic tank.
- Let the oil flow out into the vessel.
- Mount the plug. Tighten the screw connection with hand.
- Tighten the screw connections in the hydraulic tank with hand.



Hydraulic circuit filling

- Take out the ventilation filter.
- Fill the hydraulic oil through the hole into the tank.
- Replace the ventilation filter with a new one.
- Lubricate the seal ring of the new filter cap with oil.
- Mount a new filter (1).

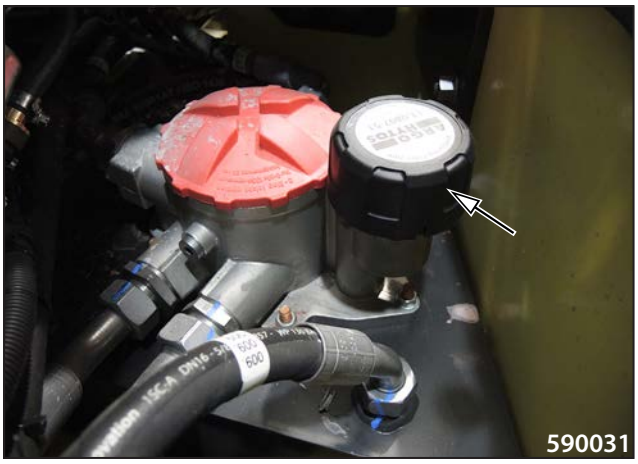
Ventilation filter
Order number: 1207934

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

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

Refill the same type of oil.

Stop the oil soaking into the ground.



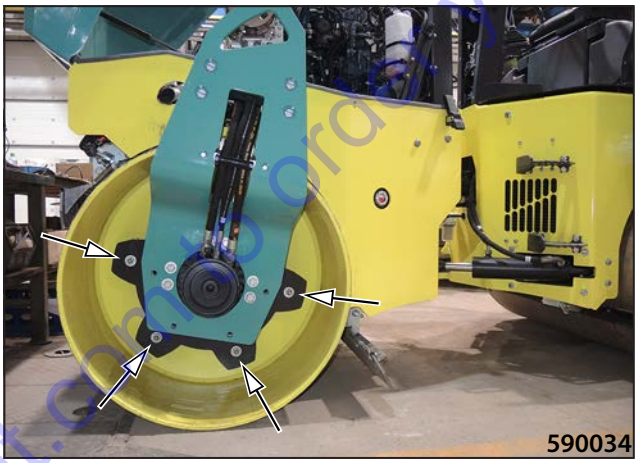
3.6.31 Damping system check

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

Replace if damaged.

Recheck screws and nuts for tightening.

Drum rubber-metal
Order number: 1631985

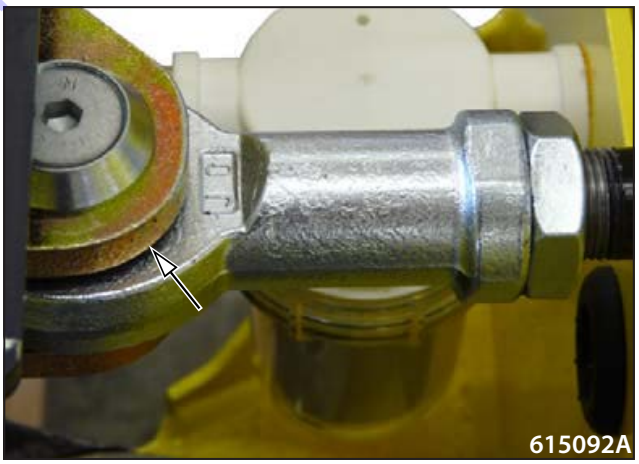


3.6.32 Swinging support check

- Once a year check the swinging support for excessive clearance.

Machine equipped with a one-point lifting lug

- Lift the machine with a crane while using the one-point lifting lug.
- Visually check the clearance of the swinging support by applying pressure on the machine alternatively upwards and downwards.

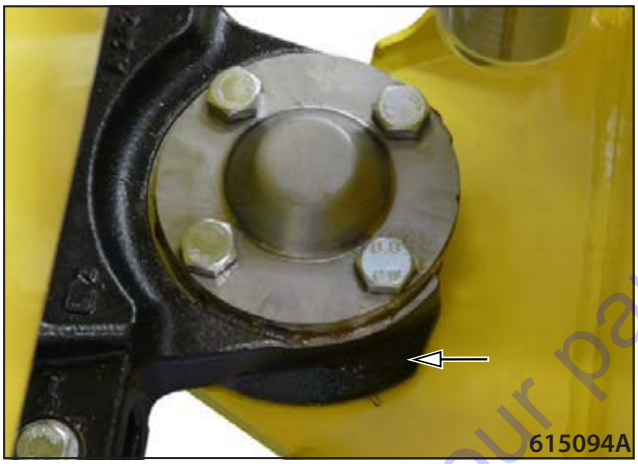


The machine is not equipped with a one-point lifting lug

- Lift the machine slightly with a suitable hydraulic jack.
- Visually check the clearance of the swinging support by applying pressure on the machine alternatively upwards and downwards.

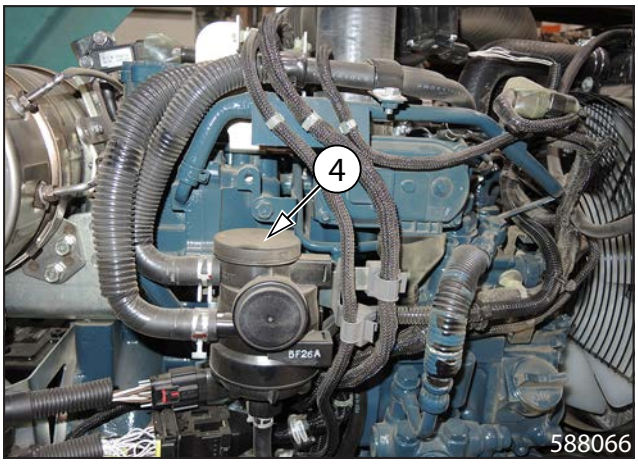
3.6.33 Articulation joint check

- Once a year check the articulation joint for excessive clearance.
- Lift the machine slightly with a suitable hydraulic jack.
- Visually check the clearance of the articulated joint by applying pressure on the machine alternatively upwards and downwards.

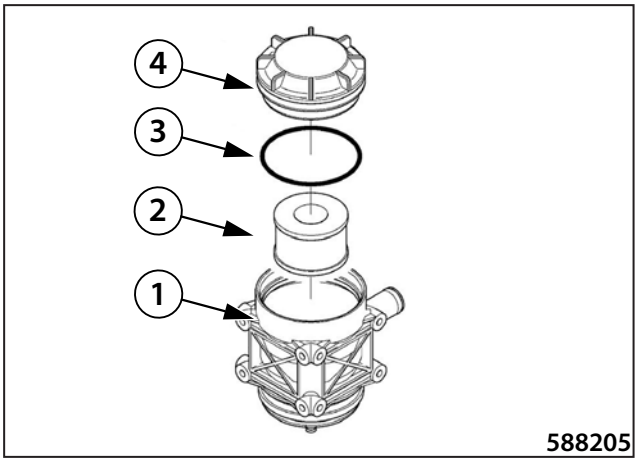


3.6.34 Oil separator cartridge replacement

- Remove the cap (4).



- Replace the filter cartridge (2) and the seal ring (3).
- Clean the internal area of the filter (1).
- Insert a new filter cartridge (2) and a seal ring (3).



3.6.35 Fuel tank cleaning

- Over time, condensed water accumulates in the fuel tank. It should be drained once a year.
- Remove the plug from the fuel tank.
- Place a vessel under the drain plug.
- Drain the engine diesel fuel.
- Check and clean the interior of the tank.
- Put on the screw plug.
- Tighten the screw connection with hand.

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

Do not smoke while working!

Catch the drained fuel.

3.6.36 Valve clearance check and adjustment

- Contact the service for adjusting the engine valves.

Every 2000 hours of operation

3.6.37 Engine coolant change

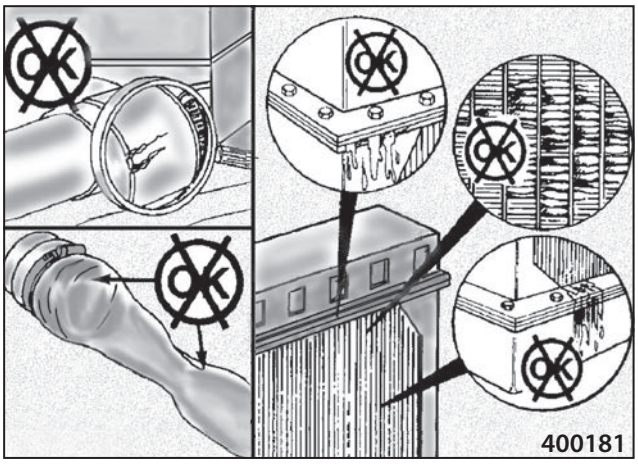
- Open the cooling system by removing the overpressure plug on the expansion tank.

- Remove the drain plug and drain the coolant.

Note

The total volume of coolant in the engine is 7.3 l (1.9 gal US).

- 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 the cooler if required.



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

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

The level must not drop below the lower mark.

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

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

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

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

Stop the oil soaking into the ground.

3.6.38 Engine belt replacement

- Contact the Kubota service for engine belt replacement.

Every 3000 hours of operation

3.6.39 DPF replacement

- Contact the Kubota service for DPF replacement.

3.6.40 Turbo-blower check

- Contact the Kubota service for turbo-blower inspection.

3.6.41 EGR valve inspection

- Contact the Kubota service for EGR valve inspection

Maintenance as required

3.6.42 Gas strut replacement

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

Gas strut
Order number: 1522243

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

There is a risk of injury!

Disassembly

- Use a screwdriver to pull out the clamps and release the struts.
- Pull out the gas strut away from the ball stud.

Installation

- Push the new gas strut on the ball stud.
- The clamp then needs to be safely seated.

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

Use genuine parts only!

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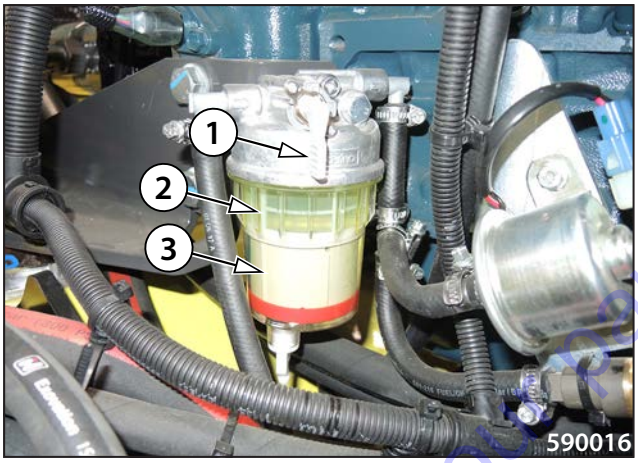
3.6.43 Cleaning the water separator



- If the red ring goes up from the bottom, drain the water from the separator.
- Close the stop valve (1).
- Unscrew the filter housing (2).
- Clean the filter element (3).
- Refit the filter housing (2).
- Open the stop valve (1).
- Turn the ignition on. The fuel pump will vent the system automatically.

3.6.44 Cleaning the water tank

- Remove the cap of the filler neck of the tank.
- Clean the strainer in the filler neck.

- Remove the drain plug of the water tank.
- Rinse the tank with running water.

3.6.45 Cleaning the machine

- Clean the machine from big impurities after completing the work.
- Clean the whole machine completely on regular basis, at least once a week.

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

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

Clean with the engine stopped.

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

Follow environmental standards and regulations when cleaning the machine!

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

Do not use forbidden cleaning agents!

3.6.46 Draining water from the sprinkling circuit before the winter season

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

- Release the quick coupler of the sprinkling hose.
- Push the ring against the screw joint.
- Remove the hose from the coupler.
- The water will flow out automatically.
- Turn on the sprinkling and let the pump run briefly. The remaining water will flow out.


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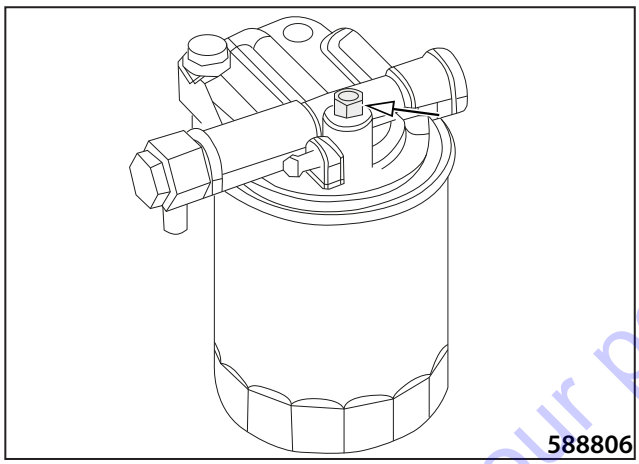
Removal of the sprinkling filter

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

3.6.47 Fuel system venting

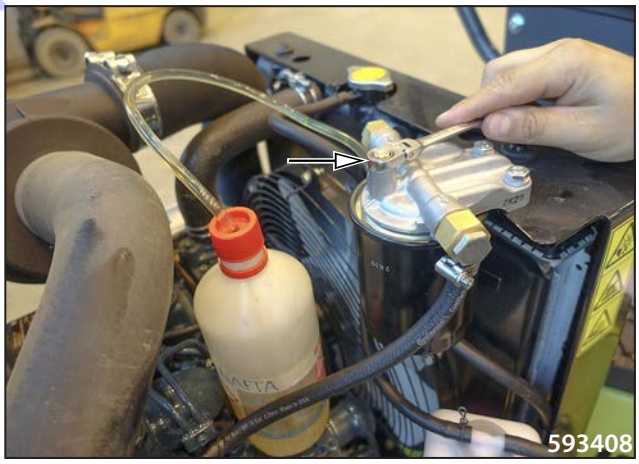
- Vent the fuel system before the first start in the following cases:
  - unless fuel filters have been filled with fuel – upon the filter replacement
  - upon the fuel pump replacement
  - upon the fuel system repair
  - long-term shut-down of the machine
  - when the tank is empty



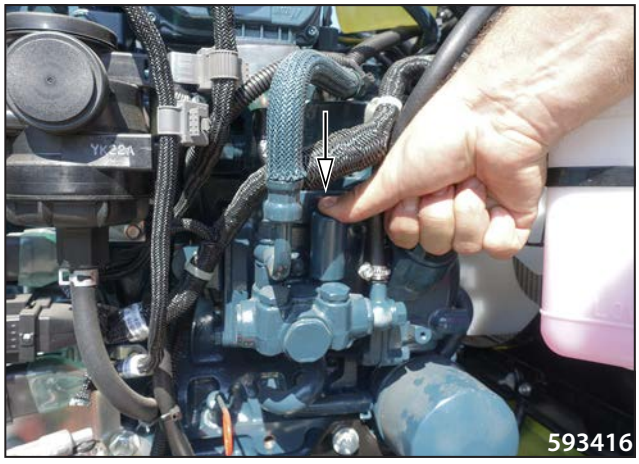
Low-pressure piping and filter venting:

- Prepare a suitable vessel.
- Connect the fuel filter bleeding hose and insert the other end into the catch pan.

- Turn the key in the ignition box to position I.
- The fuel pump starts working (it is audible).
- Loosen the bleeding screw on the fuel filter.
- Bleed the system – no air bubbles appear in the hose.
- Tighten the screw.



- Press the valve about 15 times.
- Start the engine.



Note:

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

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

Follow safety regulations!

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

Stop the fuel soaking into the ground!

3.6.48 Regeneration of clogged DPF (diesel particulate filter)

- Perform DPF regeneration according to Chapter 2.7.14 Principles of use of the machine with a diesel particulate filter (DPF).

3.6.49 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!

3.6.50 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.

3.6.51 Tightening torques

- 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

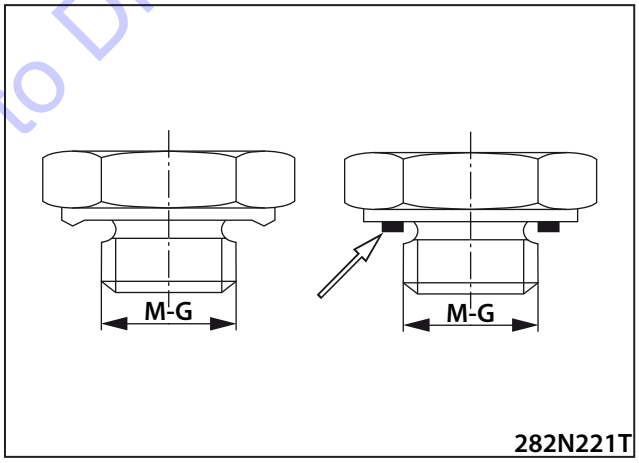
			Tightening torques of cap nuts with O-rings – hoses					
			Nm			lb ft		
Spanner size	Thread	Pipe	Nominal	Min	Max	Nominal	Min	Max
14	12×1.5	6	20	15	25	15	11	18
17	14×1.5	8	38	30	45	28	22	33
19	16×1.5	8	45	38	52	33	28	38
		10						
22	18×1.5	10	51	43	58	38	32	43
		12						
24	20×1.5	12	58	50	65	43	37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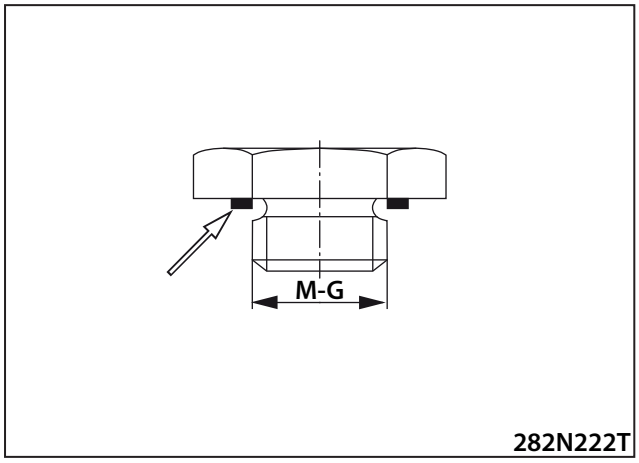

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3.7 Troubleshooting

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

Engine errors

SPN	FMI	Error description
29	0	[ENG] Accelerator Pedal Position Sensor "B" : Above normal operational range (SAE J1843)
29	1	[ENG] Accelerator Pedal Position Sensor "B" : Below normal operational range (SAE J1843)
29	2	[ENG] Accelerator Pedal Position Sensor "B" : Intermittent fault
29	3	[ENG] Accelerator position sensor 2: High
29	4	[ENG] Accelerator position sensor 2: Low
29	8	[ENG] Accelarator Pedal Position Sensor "B" : Communication fault
29	15	[ENG] Accelerator Pedal Position Sensor "B" : Not available (SAE J1843)
91	0	[ENG] Accelerator Pedal Position Sensor "B" : Below normal operational range (SAE J1843)
91	1	[ENG] Accelerator Pedal Position Sensor "A" : Below normal operational range (SAE J1843)
91	3	[ENG] Accelerator position sensor 1: High
91	4	[ENG] Accelerator position sensor 1: Low
91	15	[ENG] Accelerator Pedal Position Sensor "A" : Not available (SAE J1843)
100	1	[ENG] Oil pressure error
100	4	[ENG] Oil Pressure Switch: Low
102	3	[ENG] Boost pressure sensor: High
102	4	[ENG] Boost pressure sensor: Low
108	2	[ENG] Barometric Pressure Sensor : Intermittent fault
108	3	[ENG] Barometric pressure sensor error (High side)
108	4	[ENG] Barometric pressure sensor error (Low side)
110	0	[ENG] Engine overheat
110	2	[ENG] Engine Coolant Temperature Sensor : Intermittent fault
110	3	[ENG] Coolant temperature sensor: High
110	4	[ENG] Coolant temperature sensor: Low
132	1	[ENG] Intake air volume: Low
132	3	[ENG] MAF sensor: High
132	4	[ENG] MAF sensor: Low
132	15	[ENG] Boost pressure low
157	0	[ENG] High rail pressure
157	3	[ENG] Rail pressure sensor: High
157	4	[ENG] Rail pressure sensor: Low
158	0	[ENG] System voltage : Too High
158	1	[ENG] System voltage : Too Low
167	1	[ENG] Charge warning
167	4	[ENG] Battery Charge Switch : Low
168	3	[ENG] Battery voltage: High
168	4	[ENG] Battery voltage: Low
171	3	[ENG] Intake air temp. built-in MAF sensor: High
171	4	[ENG] Intake air temp. built-in MAF sensor: Low
172	3	[ENG] Intake air temp. error: High
172	4	[ENG] Intake air temp. error: Low
190	0	[ENG] Engine overrun
628	2	[ENG] ECU FLASH ROM error
628	12	[ENG] E-ECU internal fault : FlashROM Check Sum Error (Main Software)
630	2	[ENG] E-ECU internal fault : EEPROM Check Sum Error (Data Set 2)
630	12	[ENG] E-ECU internal fault : EEPROM ReadWrite fault
633	7	[ENG] Rail pressure limiter emergency open
636	2	[ENG] NE sensor (Crank position sensor) pulse number error

SPN	FMI	Error description
636	7	[ENG] NE-G phase shift. NE: Crankshaft position sensor. G : Camshaft position sensor
636	8	[ENG] No input of NE sensor (Crank position sensor) pulse
638	2	[ENG] Engine : Malfunction
638	3	[ENG] Engine Fuel Rack Actuator : High
638	4	[ENG] Engine Fuel Rack Actuator : Low
638	7	[ENG] Engine Fuel Rack Actuator : Mechanical Malfunction
639	12	[ENG] High Speed CAN Communication : Communication fault
651	3	[ENG] Open circuit of harness/coil in 1st cylinder injector
652	3	[ENG] Open circuit of harness/coil in 2nd cylinder injector
653	3	[ENG] Open circuit of harness/coil in 3rd cylinder injector
654	3	[ENG] Open circuit of harness/coil in 4th cylinder injector
676	0	[ENG] Glow heater relay driving circuit overheat - F308
676	5	[ENG] Open circuit of glow relay driving circuit - F306
677	4	[ENG] Ground short of Starter relay driving circuit
679	7	[ENG] Pressure limiter not open
679	16	[ENG] Rail pressure failure after pressure limiter open
723	2	[ENG] G-sensor (Camshaft position sensor) pulse number error
723	8	[ENG] No input of G sensor (Camshaft position sensor) pulse
1077	2	[ENG] ECU CPU (Main IC) error
1077	12	[ENG] Injector drive IC error or Open circuit
1078	4	[ENG] Engine Fuel Injection Pump Speed Sensor : Low
1079	2	[ENG] Sensor 5V : Intermittent fault
1079	3	[ENG] Sensor 5V: Shorted to high source
1079	4	[ENG] Sensor 5V: Shorted to low source
1136	0	[ENG] E-ECU Internal Temperature Sensor: Too high
1136	2	[ENG] E-ECU Internal Temperature Sensor: Intermittent fault
1136	3	[ENG] E-ECU Internal Temperature Sensor: High
1136	4	[ENG] E-ECU Internal Temperature Sensor: Low
1202	2	[ENG] Immobilizer : System fault
1210	3	[ENG] Engine Fuel Rack Position Sensor : High
1210	4	[ENG] Engine Fuel Rack Position Sensor : Low
1239	1	[ENG] Fuel leak (in high pressured fuel system)
1347	3	[ENG] Batt short circuit of SCV (MPROP)
1347	4	[ENG] SCV (MPROP) drive system error
1347	5	[ENG] Open circuit of SCV (MPROP)
1347	7	[ENG] SCV(MPROP) stuck
1485	2	[ENG] Main relay is locked in closed position
1485	4	[ENG] E-ECU Main Relay : Low
3242	0	[ENG] Emergency Exhaust gas temperature sensor 1: High
3242	3	[ENG] Exhaust gas temperature sensor 1: High
3242	4	[ENG] Exhaust gas temperature sensor 1: Low
3246	0	[ENG] Emergency Exhaust gas temperature sensor 2: High - F155
3246	3	[ENG] Exhaust gas temperature sensor 2: High - F264
3246	4	[ENG] Exhaust gas temperature sensor 2: Low - F263
3251	3	[ENG] Differential pressure sensor 1: High
3251	4	[ENG] Differential pressure sensor 1: Low
3252	0	[ENG] Emission deterioration
3509	3	[ENG] Sensor supply voltage 1: High

SPN	FMI	Error description
3509	4	[ENG] Sensor supply voltage 1: Low
3510	3	[ENG] Sensor supply voltage 2: High - F211
3510	4	[ENG] Sensor supply voltage 2: Low - F210
3511	3	[ENG] Sensor supply voltage 3: High
3511	4	[ENG] Sensor supply voltage 3: Low
3701	0	[ENG] Excessive PM5
3701	15	[ENG] Excessive PM3
3701	16	[ENG] Excessive PM4
4765	0	[ENG] Emergency Exhaust gas temperature sensor 0: High - F153
4765	3	[ENG] Exhaust gas temperature sensor 0: High - F257
4765	4	[ENG] Exhaust gas temperature sensor 0: Low - F256
52317	31	[ENG] Engine overheat - coolant temperature over 110°C
522242	2	[ENG] Cold Start Device : Intermittent fault
522242	3	[ENG] Cold Start Device : Circuit fault B
522242	4	[ENG] Cold Start Device : Circuit fault A
522243	2	[ENG] Air Heater Relay : Intermittent fault
522243	3	[ENG] Air Heater Relay : Circuit fault B
522243	4	[ENG] Air Heater Relay : Circuit fault A
522251	3	[ENG] EGR Stepping Motor "A" : Circuit fault B
522251	4	[ENG] EGR Stepping Motor "A" : Circuit fault A
522252	3	[ENG] EGR Stepping Motor "B" : Circuit fault B
522252	4	[ENG] EGR Stepping Motor "B" : Circuit fault A
522253	3	[ENG] EGR Stepping Motor "C" : Circuit fault B
522253	4	[ENG] EGR Stepping Motor "C" : Circuit fault A
522254	3	[ENG] EGR Stepping Motor "D" : Circuit fault B
522254	4	[ENG] EGR Stepping Motor "D" : Circuit fault A
522314	0	[ENG] Engine Coolant Temperature : Abnormal Malfunction
522323	0	[ENG] Air Cleaner : Mechanical Malfunction
522329	0	[ENG] Oily Water Separator : Michanical Malfunction
522402	4	[ENG] Auxiliary Speed Sensor : Low
522727	12	[ENG] E-ECU internal fault : Sub-CPU Error A or Error B or Error C
522728	12	[ENG] E-ECU internal fault: Engine Map Data Version Error
522730	8	[ENG] Immobilizer : CAN Communication fault
522730	12	[ENG] Immobilizer : Pulse Communication fault
523523	3	[ENG] No.1 & 4 cylinder injector short to +B or GND
523524	3	[ENG] No. 2 & 3cylinder injector short to +B or GND
523525	1	[ENG] Injector charge voltage: Low
523527	2	[ENG] ECU CPU (Monitoring IC) error
523535	0	[ENG] Injector charge voltage: High
523538	2	[ENG] QR (IQA) data error
523538	7	[ENG] No QR (IQA) data
523543	2	[ENG] Accelerator position sensor error (CAN)
523544	3	[ENG] Batt short of glow relay driving circuit
523544	4	[ENG] Ground short of glow relay driving circuit
523547	2	[ENG] CAN2 Bus off
523548	2	[ENG] CAN-KBT Frame error
523572	4	[ENG] EGR position sensor failure
523574	3	[ENG] EGR actuator open circuit

SPN	FMI	Error description
523574	4	[ENG] EGR actuator coil short
523575	7	[ENG] EGR actuator valve stuck
523576	2	[ENG] EGR (DC motor) overheat
523577	2	[ENG] EGR (DC motor) temp. sensor failure
523578	2	[ENG] No communication with EGR
523580	2	[ENG] Intake throttle feedback error
523582	3	[ENG] Intake throttle lift sensor: High
523582	4	[ENG] Intake throttle lift sensor: Low
523589	17	[ENG] Low coolant temp. in parked regeneration
523590	16	[ENG] Parked regeneration time out
523591	2	[ENG] CAN CCVS (Parking SW and Vehicle speed) frame error
523592	2	[ENG] CAN CM1 (Regen SW) frame error
523593	2	[ENG] CAN DDC1 (Transmission) frame error
523594	2	[ENG] CAN ETC2 (Neutral SW) frame error
523595	2	[ENG] CAN ETC5 (Neutral SW) frame error
523596	2	[ENG] CAN TSC1 frame error
523598	2	[ENG] CAN EBC1 frame error
523599	0	[ENG] All exhaust temp. sensor failure
523601	0	[ENG] High exhaust gas temp. after emergency high temp. DTC.
523602	0	[ENG] High frequency of regeneration
523603	15	[ENG] Over heat pre-caution - F355
523604	2	[ENG] CAN1 Bus off
523605	6	[ENG] Internal injector drive circuit short
523700	13	[ENG] EEPROM check sum error

Errors hardware TTC

SPN	FMI	Error description
50000	31	[HW] Ecu0_Safety - Input board circuit error - supply check needed
50001	31	[HW] Ecu0_Safety - Fatal input board circuit error
50002	31	[HW] Ecu0_Safety - Input pin error - check ECU Timer-Inputs and EMI
50003	31	[HW] Ecu0_Safety - Digital pin error - check ECU hardware and EMI
50004	31	[HW] Ecu0_Safety - PWM output error - check ECU hardware and EMI
50005	31	[HW] Ecu0_Safety - CPU core error - check source code and EMI
50006	31	[HW] Ecu0_Safety - Memory error
50007	31	[HW] Ecu0_Safety - Error during watchdog startup - check watchdog timing constraints
50008	31	[HW] Ecu1_Safety - Safety switch error - check external shut-off pins and ECU hardware
50009	31	[HW] Ecu1_Safety - Application code called safe state
50010	12	[HW] CAN_BUS2 - CAN Bus off
50011	12	[HW] CAN_BUS2 - CAN warning
50012	31	[HW] Ecu1_Safety - Fatal error caused safe state - replace ECU
50013	31	[HW] Ecu1_Safety - BSP error caused safe state - replace ECU
50014	31	[HW] EcuSil - Task overload
50015	31	[HW] EcuSil - Batttery Low
50016	31	[HW] EcuSil - Battery High
50017	31	[HW] EcuSil - Temperature Low
50018	31	[HW] EcuSil - Temperature High
50019	31	[HW] SensorSupply - Sensor Supply S1 Low
50020	31	[HW] SensorSupply - Sensor Supply S1 High
50021	31	[HW] SensorSupply - Sensor Supply S2 Low
50022	31	[HW] SensorSupply - Sensor Supply S2 High
50023	31	[HW] SensorSupply - Sensor Supply 5V Low
50024	31	[HW] SensorSupply - Sensor Supply 5V High
50025	31	[HW] ErrList - List load oneset
50026	31	[HW] ErrList - List load defect
50027	31	[HW] ErrList - List store defect
50028	31	[HW] ErrList - DM_LIST_OVERFLOW
50029	12	[HW] CAN_BUS0 - CAN Bus off
50030	12	[HW] CAN_BUS0 - CAN warning
50031	31	[HW] CBUS0_HWBUF_SND0 - HW-Buffer overflow send
50032	31	[HW] CBUS0_HWBUF_SND1 - HW-Buffer overflow send
50033	31	[HW] CBUS0_HWBUF_SND2 - HW-Buffer overflow send
50034	31	[HW] CBUS0_HWBUF_SND3 - HW-Buffer overflow send
50035	31	[HW] CBUS0_HWBUF_SND4 - HW-Buffer overflow send
50036	31	[HW] CBUS0_HWBUF_SND5 - HW-Buffer overflow send
50037	31	[HW] CBUS0_HWBUF_RCV0 - HW-Buffer overflow receive
50039	31	[HW] CBUS0_HWBUF_RCV2 - HW-Buffer overflow receive
50040	31	[HW] CBUS0_HWBUF_RCV3 - HW-Buffer overflow receive
50041	31	[HW] CBUS0_HWBUF_RCV4 - HW-Buffer overflow receive
50042	31	[HW] CBUS0_HWBUF_RCV5 - HW-Buffer overflow receive
50043	31	[HW] CBUS0_HWBUF_RCV6 - HW-Buffer overflow receive
50044	31	[HW] CBUS0_HWBUF_RCV7 - HW-Buffer overflow receive
50045	31	[HW] CBUS0_CBUF_SND_1 - Software Buffer SW-Overflow
50046	12	[HW] CAN_BUS1 - CAN Bus off
50047	12	[HW] CAN_BUS1 - CAN warning

SPN	FMI	Error description
50048	31	[HW] CBUS1_HWBUF_SND0 - HW-Buffer overflow send
50049	31	[HW] CBUS1_HWBUF_SND1 - HW-Buffer overflow send
50050	31	[HW] CBUS1_HWBUF_SND2 - HW-Buffer overflow send
50051	31	[HW] CBUS1_HWBUF_SND3 - HW-Buffer overflow send
50052	31	[HW] CBUS1_HWBUF_SND4 - HW-Buffer overflow send
50053	31	[HW] CBUS1_HWBUF_SND5 - HW-Buffer overflow send
50054	31	[HW] CBUS1_HWBUF_RCV0 - HW-Buffer overflow receive
50055	31	[HW] CBUS1_HWBUF_RCV1 - HW-Buffer overflow receive
50056	31	[HW] CBUS1_HWBUF_RCV2 - HW-Buffer overflow receive
50057	31	[HW] CBUS1_HWBUF_RCV3 - HW-Buffer overflow receive
50058	31	[HW] CBUS1_HWBUF_RCV4 - HW-Buffer overflow receive
50059	31	[HW] CBUS1_HWBUF_RCV5 - HW-Buffer overflow receive
50060	31	[HW] CBUS1_HWBUF_RCV6 - HW-Buffer overflow receive
50061	31	[HW] CBUS1_HWBUF_RCV7 - HW-Buffer overflow receive
50062	31	[HW] CBUS2_HWBUF_SND0 - HW-Buffer overflow send
50063	31	[HW] CBUS2_HWBUF_SND1 - HW-Buffer overflow send
50064	31	[HW] CBUS2_HWBUF_SND2 - HW-Buffer overflow send
50065	31	[HW] CBUS2_HWBUF_SND3 - HW-Buffer overflow send
50066	31	[HW] CBUS2_HWBUF_SND4 - HW-Buffer overflow send
50067	31	[HW] CBUS2_HWBUF_SND5 - HW-Buffer overflow send
50068	31	[HW] CBUS2_HWBUF_RCV0 - HW-Buffer overflow receive
50069	31	[HW] CBUS2_HWBUF_RCV1 - HW-Buffer overflow receive
50070	31	[HW] CBUS2_HWBUF_RCV2 - HW-Buffer overflow receive
50071	31	[HW] CBUS2_HWBUF_RCV3 - HW-Buffer overflow receive
50072	31	[HW] CBUS2_HWBUF_RCV4 - HW-Buffer overflow receive
50073	31	[HW] CBUS2_HWBUF_RCV5 - HW-Buffer overflow receive
50074	31	[HW] CBUS2_HWBUF_RCV6 - HW-Buffer overflow receive
50075	31	[HW] CBUS2_HWBUF_RCV7 - HW-Buffer overflow receive
50076	31	[HW] CAN msg ACE_CM_MuruDeltaPhi Message Buffer Overflow
50078	31	[HW] CAN msg Engine_J1939_EGF1 Message Buffer Overflow
50079	31	[HW] CAN msg Engine_J1939_EGF1 Invalid Message
50080	31	[HW] CAN msg Engine_J1939_EGF1 Count Fault
50081	31	[HW] CAN msg Engine_J1939_EGF1 Timeslot
50084	31	[HW] CAN msg CM_PDO1_basic_DAQ_meas Message Buffer Overflow
50085	31	[HW] CAN msg CM_PDO1_basic_DAQ_meas Invalid Message
50086	31	[HW] CAN msg CM_PDO1_basic_DAQ_meas Count Fault
50087	31	[HW] CAN msg CM_PDO1_basic_DAQ_meas Timeslot
50089	31	[HW] CAN msg CM_PDO2_additional_ampl Message Buffer Overflow
50090	31	[HW] CAN msg CM_PDO2_additional_ampl Invalid Message
50091	31	[HW] CAN msg CM_PDO2_additional_ampl Count Fault
50092	31	[HW] CAN msg CM_PDO2_additional_ampl Timeslot
50094	31	[HW] CAN msg CM_PDO3_compaction_meas Message Buffer Overflow
50095	31	[HW] CAN msg CM_PDO3_compaction_meas Invalid Message
50096	31	[HW] CAN msg CM_PDO3_compaction_meas Count Fault
50097	31	[HW] CAN msg CM_PDO3_compaction_meas Timeslot
50099	31	[HW] CAN msg CM1_PDO4_Status Message Buffer Overflow
50100	31	[HW] CAN msg CM1_PDO4_Status Invalid Message
50101	31	[HW] CAN msg CM1_PDO4_Status Count Fault

SPN	FMI	Error description
50102	31	[HW] CAN msg CM1_PDO4_Status Timeslot
50103	31	[HW] CAN msg CM_SDO_ClientInit Message Buffer Overflow
50105	31	[HW] CAN msg CM_SDO_ServerAnsw Message Buffer Overflow
50106	31	[HW] CAN msg CM_SDO_ServerAnsw Invalid Message
50107	31	[HW] CAN msg CM_SDO_ServerAnsw Count Fault
50108	31	[HW] CAN msg CM_SDO_ServerAnsw Timeslot
50109	31	[HW] CAN msg Engine_J1939_TSC1 Message Buffer Overflow

Errors pins TTC

SPN	FMI	Error description
51000	2	[PIN_150] VibrRearDrum - Warning: a block has limited parameters
51000	3	[PIN_150] VibrRearDrum - An input signal is too high / Short circuit to power
51000	4	[PIN_150] VibrRearDrum - An input signal is too low / Short circuit to ground
51000	26	[PIN_150] VibrRearDrum - An input signal is out of valid range
51000	30	[PIN_150] VibrRearDrum - An initialization error
51001	2	[PIN_174] VibrMode - Warning: a block has limited parameters
51001	3	[PIN_174] VibrMode - An input signal is too high / Short circuit to power
51001	4	[PIN_174] VibrMode - An input signal is too low / Short circuit to ground
51001	26	[PIN_174] VibrMode - An input signal is out of valid range
51001	30	[PIN_174] VibrMode - An initialization error
51002	2	[PIN_101] VibrTypeFineLow - Warning: a block has limited parameters
51002	3	[PIN_101] VibrTypeFineLow - An input signal is too high / Short circuit to power
51002	4	[PIN_101] VibrTypeFineLow - An input signal is too low / Short circuit to ground
51002	26	[PIN_101] VibrTypeFineLow - An input signal is out of valid range
51002	30	[PIN_101] VibrTypeFineLow - An initialization error
51005	2	[PIN_125] VibrTypeRoughLow - Warning: a block has limited parameters
51005	3	[PIN_125] VibrTypeRoughLow - An input signal is too high / Short circuit to power
51005	4	[PIN_125] VibrTypeRoughLow - An input signal is too low / Short circuit to ground
51005	26	[PIN_125] VibrTypeRoughLow - An input signal is out of valid range
51005	30	[PIN_125] VibrTypeRoughLow - An initialization error
51006	0	[PIN_156] VibrFrontOn - HS Short To Power internal
51006	3	[PIN_156] VibrFrontOn - HS OpenLoad / Short To Power external
51006	4	[PIN_156] VibrFrontOn - HS Short To Ground
51006	12	[PIN_156] VibrFrontOn - Internal Driver Error
51007	0	[PIN_180] VibrRearOn - HS Short To Power internal
51007	3	[PIN_180] VibrRearOn - HS OpenLoad / Short To Power external
51007	4	[PIN_180] VibrRearOn - HS Short To Ground
51007	12	[PIN_180] VibrRearOn - Internal Driver Error
51008	0	[PIN_183] VibrRoughOn - HS Short To Power internal
51008	3	[PIN_183] VibrRoughOn - HS OpenLoad / Short To Power external
51008	4	[PIN_183] VibrRoughOn - HS Short To Ground
51008	12	[PIN_183] VibrRoughOn - Internal Driver Error
51009	0	[PIN_159] VibrHighOn - HS Short To Power internal
51009	3	[PIN_159] VibrHighOn - HS OpenLoad / Short To Power external
51009	4	[PIN_159] VibrHighOn - HS Short To Ground
51009	12	[PIN_159] VibrHighOn - Internal Driver Error
51010	3	[PIN_134] SprinkPot - Master input signal short to power
51010	12	[PIN_134] SprinkPot - Unknown internal error
51010	24	[PIN_134] SprinkPot - Parameter of input char NOT monoton
51010	27	[PIN_134] SprinkPot - Master input signal short to ground
51011	0	[PIN_179] Sprinkling - HS Short To Power internal
51011	3	[PIN_179] Sprinkling - HS OpenLoad / Short To Power external
51011	4	[PIN_179] Sprinkling - HS Short To Ground
51011	12	[PIN_179] Sprinkling - Internal Driver Error
51012	0	[PIN_158] SprinklingCutter - HS Short To Power internal
51012	3	[PIN_158] SprinklingCutter - HS OpenLoad / Short To Power external
51012	4	[PIN_158] SprinklingCutter - HS Short To Ground

SPN	FMI	Error description
51012	12	[PIN_158] SprinklingCutter - Internal Driver Error
51013	0	[PIN_182] SprinklingEmulse - HS Short To Power internal
51013	3	[PIN_182] SprinklingEmulse - HS OpenLoad / Short To Power external
51013	4	[PIN_182] SprinklingEmulse - HS Short To Ground
51013	12	[PIN_182] SprinklingEmulse - Internal Driver Error
51014	0	[PIN_157] CutterUp - HS Short To Power internal
51014	3	[PIN_157] CutterUp - HS OpenLoad / Short To Power external
51014	4	[PIN_157] CutterUp - HS Short To Ground
51014	12	[PIN_157] CutterUp - Internal Driver Error
51015	0	[PIN_181] CutterDown - HS Short To Power internal
51015	3	[PIN_181] CutterDown - HS OpenLoad / Short To Power external
51015	4	[PIN_181] CutterDown - HS Short To Ground
51015	12	[PIN_181] CutterDown - Internal Driver Error
51100	3	[PIN_153] PumpFW - Short circuit to power
51100	4	[PIN_153] PumpFW - Short circuit to ground
51100	25	[PIN_153] PumpFW - Open circuit
51100	26	[PIN_153] PumpFW - Deviation of current control
51100	30	[PIN_153] PumpFW - Internal error
51101	3	[PIN_177] PumpRW - Short circuit to power
51101	4	[PIN_177] PumpRW - Short circuit to ground
51101	25	[PIN_177] PumpRW - Open circuit
51101	26	[PIN_177] PumpRW - Deviation of current control
51101	30	[PIN_177] PumpRW - Internal error
51103	0	[PIN_186] BrakeValve - HS Short To Power internal
51103	3	[PIN_186] BrakeValve - HS OpenLoad / Short To Power external
51103	4	[PIN_186] BrakeValve - HS Short To Ground
51103	12	[PIN_186] BrakeValve - Internal Driver Error
51104	0	[PIN_152] Difflock - HS Short To Power internal
51104	3	[PIN_152] Difflock - HS OpenLoad / Short To Power external
51104	4	[PIN_152] Difflock - HS Short To Ground
51104	12	[PIN_152] Difflock - Internal Driver Error
51107	2	[PIN_151] BrakePressure - Warning: a block has limited parameters
51107	3	[PIN_151] BrakePressure - An input signal is too high / Short circuit to power
51107	4	[PIN_151] BrakePressure - An input signal is too low / Short circuit to ground
51107	26	[PIN_151] BrakePressure - An input signal is out of valid range
51107	30	[PIN_151] BrakePressure - An initialization error
51200	0	[PIN_162] StarterRun - HS Short To Power internal
51200	3	[PIN_162] StarterRun - HS OpenLoad / Short To Power external
51200	4	[PIN_162] StarterRun - HS Short To Ground
51200	12	[PIN_162] StarterRun - Internal Driver Error
51203	0	[PIN_161] FuelValve - HS Short To Power internal
51203	3	[PIN_161] FuelValve - HS OpenLoad / Short To Power external
51203	4	[PIN_161] FuelValve - HS Short To Ground
51203	12	[PIN_161] FuelValve - Internal Driver Error
51204	0	[PIN_161] EngEcuOn - HS Short To Power internal
51204	3	[PIN_161] EngEcuOn - HS OpenLoad / Short To Power external
51204	4	[PIN_161] EngEcuOn - HS Short To Ground
51204	12	[PIN_161] EngEcuOn - Internal Driver Error

SPN	FMI	Error description
51205	0	[PIN_188] PreheatRelay - HS Short To Power internal
51205	3	[PIN_188] PreheatRelay - HS OpenLoad / Short To Power external
51205	4	[PIN_188] PreheatRelay - HS Short To Ground
51205	12	[PIN_188] PreheatRelay - Internal Driver Error
51206	2	[PIN_114] PreheatingIn - Warning: a block has limited parameters
51206	3	[PIN_114] PreheatingIn - An input signal is too high / Short circuit to power
51206	4	[PIN_114] PreheatingIn - An input signal is too low / Short circuit to ground
51206	26	[PIN_114] PreheatingIn - An input signal is out of valid range
51206	30	[PIN_114] PreheatingIn - An initialization error
51207	2	[PIN_126] EngineOverheat - Warning: a block has limited parameters
51207	3	[PIN_126] EngineOverheat - An input signal is too high / Short circuit to power
51207	4	[PIN_126] EngineOverheat - An input signal is too low / Short circuit to ground
51207	26	[PIN_126] EngineOverheat - An input signal is out of valid range
51207	30	[PIN_126] EngineOverheat - An initialization error
51208	2	[PIN_102] EngineOilPressure - Warning: a block has limited parameters
51208	3	[PIN_102] EngineOilPressure - An input signal is too high / Short circuit to power
51208	4	[PIN_102] EngineOilPressure - An input signal is too low / Short circuit to ground
51208	26	[PIN_102] EngineOilPressure - An input signal is out of valid range
51208	30	[PIN_102] EngineOilPressure - An initialization error
51300	3	[PIN_103] FuelTank - Input signal short to power
51300	4	[PIN_103] FuelTank - Input signal short to ground
51300	12	[PIN_103] FuelTank - Internal Block error
51301	3	[PIN_104] Infratemperature - Master input signal short to power
51301	12	[PIN_104] Infratemperature - Unknown internal error
51301	24	[PIN_104] Infratemperature - Parameter of input char NOT monoton
51301	27	[PIN_104] Infratemperature - Master input signal short to ground
51302	2	[PIN_122] FrontParkingLights - Warning: a block has limited parameters
51302	3	[PIN_122] FrontParkingLights - An input signal is too high / Short circuit to power
51302	4	[PIN_122] FrontParkingLights - An input signal is too low / Short circuit to ground
51302	26	[PIN_122] FrontParkingLights - An input signal is out of valid range
51302	30	[PIN_122] FrontParkingLights - An initialization error
51303	2	[PIN_123] LeftDirectionLights - Warning: a block has limited parameters
51303	3	[PIN_123] LeftDirectionLights - An input signal is too high / Short circuit to power
51303	4	[PIN_123] LeftDirectionLights - An input signal is too low / Short circuit to ground
51303	26	[PIN_123] LeftDirectionLights - An input signal is out of valid range
51303	30	[PIN_123] LeftDirectionLights - An initialization error
51304	2	[PIN_124] StartT50 - Warning: a block has limited parameters
51304	3	[PIN_124] StartT50 - An input signal is too high / Short circuit to power
51304	4	[PIN_124] StartT50 - An input signal is too low / Short circuit to ground
51304	26	[PIN_124] StartT50 - An input signal is out of valid range
51304	30	[PIN_124] StartT50 - An initialization error
51305	3	[PIN_128] HydrTempR - Input signal short to power
51305	4	[PIN_128] HydrTempR - Input signal short to ground
51305	12	[PIN_128] HydrTempR - Internal Block error
51306	24	[PIN_111 PIN_135] SeatSwitch - Logical Error between pin 0 and 1
51307	3	[PIN_111 PIN_135] SeatSwitch - Vin0 > u16VolHiMax
51307	26	[PIN_111 PIN_135] SeatSwitch - u16VolLoMax < Vin0 < u16VolHiMin
51308	3	[PIN_111 PIN_135] SeatSwitch - Vin1 > u16VolHiMax

SPN	FMI	Error description
51308	26	[PIN_111 PIN_135] SeatSwitch - u16VolLoMax < Vin1 < u16VolHiMin
51309	2	[PIN_138] PreheatingLamp - Warning: a block has limited parameters
51309	3	[PIN_138] PreheatingLamp - An input signal is too high / Short circuit to power
51309	4	[PIN_138] PreheatingLamp - An input signal is too low / Short circuit to ground
51309	26	[PIN_138] PreheatingLamp - An input signal is out of valid range
51309	30	[PIN_138] PreheatingLamp - An initialization error
51310	2	[PIN_146] FrontHeadLights - Warning: a block has limited parameters
51310	3	[PIN_146] FrontHeadLights - An input signal is too high / Short circuit to power
51310	4	[PIN_146] FrontHeadLights - An input signal is too low / Short circuit to ground
51310	26	[PIN_146] FrontHeadLights - An input signal is out of valid range
51310	30	[PIN_146] FrontHeadLights - An initialization error
51311	2	[PIN_147] RightDirectionLights - Warning: a block has limited parameters
51311	3	[PIN_147] RightDirectionLights - An input signal is too high / Short circuit to power
51311	4	[PIN_147] RightDirectionLights - An input signal is too low / Short circuit to ground
51311	26	[PIN_147] RightDirectionLights - An input signal is out of valid range
51311	30	[PIN_147] RightDirectionLights - An initialization error
51312	2	[PIN_148] Immobiliser - Warning: a block has limited parameters
51312	3	[PIN_148] Immobiliser - An input signal is too high / Short circuit to power
51312	4	[PIN_148] Immobiliser - An input signal is too low / Short circuit to ground
51312	26	[PIN_148] Immobiliser - An input signal is out of valid range
51312	30	[PIN_148] Immobiliser - An initialization error
51313	0	[PIN_154] Fan - HS Short To Power internal
51313	3	[PIN_154] Fan - HS OpenLoad / Short To Power external
51313	4	[PIN_154] Fan - HS Short To Ground
51313	12	[PIN_154] Fan - Internal Driver Error
51315	0	[PIN_191] Horn - HS Short To Power internal
51315	3	[PIN_191] Horn - HS OpenLoad / Short To Power external
51315	4	[PIN_191] Horn - HS Short To Ground
51315	12	[PIN_191] Horn - Internal Driver Error
51318	0	[PIN_194] TelematicEngineRun - HS Short To Power internal
51318	4	[PIN_194] TelematicEngineRun - HS Short To Ground
51318	12	[PIN_194] TelematicEngineRun - Internal Driver Error
51319	0	[PIN_251] PumpReturn - HS Short To Power internal
51319	3	[PIN_251] PumpReturn - HS OpenLoad / Short To Power external
51319	4	[PIN_251] PumpReturn - HS Short To Ground
51319	12	[PIN_251] PumpReturn - Internal Driver Error
51320	0	[PIN_238] BrakeReturn - HS Short To Power internal
51320	3	[PIN_238] BrakeReturn - HS OpenLoad / Short To Power external
51320	4	[PIN_238] BrakeReturn - HS Short To Ground
51320	12	[PIN_238] BrakeReturn - Internal Driver Error
51321	0	[PIN_160] Edge Cutter HS Short To Power internal
51321	3	[PIN_160] Edge Cutter HS OpenLoad / Short To Power external
51321	4	[PIN_160] Edge Cutter HS Short To Ground
51321	12	[PIN_160] Edge Cutter Internal Driver Error

Safety machine errors

SPN	FMI	Error description
52000	31	[SF] SF2.1 - SafetyFunction Drive pump diagnostic (SF_PumpDiagnostics)
52001	31	[SF] SF2.2 - SafetyFunction Operator presence detection hard ramp (SF_OperatorPresenceDetection-Hard)
52002	31	[SF] SF2.3 - SafetyFunction Emergency stop (SF_EmcyStop)
52003	31	[SF] SF2.4 - SafetyFunction Parking brake monitoring (SF_ParkingBrakeMonitoring)
52004	31	[SF] SF2.5 - SafetyFunction Drive lever position validation (SF_DriveLeverPosValidation)
52005	31	[SF] SF2.6 - SafetyFunction Parking brake diagnostic (SF_ParkingBrakeDiagnostic)
52006	31	[SF] SF2.9 - SafetyFunction Drive direction (SF_DriveDirection)
52007	31	[SF] SF2.10 - SafetyFunction Seat Switch Monitoring (SF_SeatSwitchMonitoring)
52008	31	[SF] SF3.1 - SafetyFunction Drive lever crosscheck (SF_DriveLeverCrosscheck)
52009	31	[SF] SF3.2 / SF3.7 - SafetyFunction Operator presence detection soft ramp (SF_OperatorPresenceDetectionSoft)
52010	31	[SF] SF3.3 - SafetyFunction Gear switch pump limitation (SF_GearSwitchPumpLimitation)
52012	31	[SF] SF4.1 - SafetyFunction Drive lever CAN validation (SF_DriveLeverCANValidation)
52013	31	[SF] SF4.2 - SafetyFunction Drive lever Emergency Stop - panic reaction (SF_DriveLeverEMCYStop)
52014	31	[SF] SF4.7 - SafetyFunction Drive lever presence (SF_DriveLeverCount)
52015	31	[SF] SF5.1 - SafetyFunction Hydraulic oil over temperature (SF_HydrOilOverTemperature)
52016	31	[SF] SF5.2 - SafetyFunction Hydraulic temperature sensor diagnostic (SF_HydrOilTempSensorDiagnostics)
52017	31	[SF] SF6.1 - SafetyFunction Gear switch crosscheck (SF_GearSwitchCrossCheck)
52018	31	[SF] SF7.1 - SafetyFunction Drive lever autodetection (SF_DriveLeverAutodetection)

Software errors

SPN	FMI	Error description
52100	31	[SW] SafeApp module DLEVR function SetParam unsuccessful
52101	31	[SW] SafeApp module SFOM_Pump function SetParam unsuccessful
52102	31	[SW] SafeApp module SFOM_ParkBrake function SetParam unsuccessful
52103	31	[SW] SafeApp module DMGT function Init unsuccessful
52104	31	[SW] SafeApp module DLEVR function Init unsuccessful
52105	31	[SW] SafeApp module SFOM_ShutOff function Init unsuccessful
52106	31	[SW] SafeApp module SFOM_Pump function Init unsuccessful
52107	31	[SW] SafeApp module SFOM_ParkBrake function Init unsuccessful
52108	31	[SW] SafeApp module SFOM_EMCYStop function Init unsuccessful
52200	31	[SW] App module ENG SetParam unsuccessful
52201	31	[SW] App module VIBR SetParam unsuccessful
52202	31	[SW] App module DRIVE SetParam unsuccessful
52203	31	[SW] App module ECO SetParam unsuccessful
52204	31	[SW] App module REL SetParam unsuccessful
52205	31	[SW] App module COOL SetParam unsuccessful
52206	31	[SW] App module EMCY SetParam unsuccessful
52207	31	[SW] App module CANMSG SetParam unsuccessful
52208	31	[SW] App module ERR SetParam unsuccessful
52209	31	[SW] App module SPRKL SetParam unsuccessful
52210	31	[SW] App module LIGSIG SetParam unsuccessful
52211	31	[SW] App module CUT SetParam unsuccessful
52212	31	[SW] App module BTN SetParam unsuccessful
52213	31	[SW] App module TCU SetParam unsuccessful
52214	31	[SW] App module DMGT function Init unsuccessful
52215	31	[SW] App module ENG function Init unsuccessful
52216	31	[SW] App module VIBR function Init unsuccessful
52217	31	[SW] App module DRIVE function Init unsuccessful
52218	31	[SW] App module ECO function Init unsuccessful
52219	31	[SW] App module REL function Init unsuccessful
52220	31	[SW] App module COOL function Init unsuccessful
52221	31	[SW] App module EMCY function Init unsuccessful
52222	31	[SW] App module CANMSG function Init unsuccessful
52223	31	[SW] App module ERR function Init unsuccessful
52224	31	[SW] App module SPRKL function Init unsuccessful
52225	31	[SW] App module LIGSIG function Init unsuccessful
52226	31	[SW] App module CUT function Init unsuccessful
52227	31	[SW] App module BTN function Init unsuccessful
52228	31	[SW] App module TCU function Init unsuccessful
52229	31	[SW] App module HMI function Init unsuccessful
52230	31	[SW] App module CALIB function Init unsuccessful
52231	31	[SW] App module SERV function Init unsuccessful
52232	31	[SW] App module INCTRL function Init unsuccessful
52233	31	[SW] App module HMI function SetParam unsuccessful
52234	31	[SW] App module CALIB function SetParam unsuccessful
52235	31	[SW] App module SERV function SetParam unsuccessful
52236	31	[SW] App module INCTRL function SetParam unsuccessful
52237	31	[SW] Software blocks of pins initialization unsuccessful

SPN	FMI	Error description
52238	31	[SW] App module Compaction Module function Init unsuccessful
52239	31	[SW] App module Compaction Module function SetParam unsuccessful

Machine errors

SPN	FMI	Error description
52011	31	[MACH] Drive lever CAN validation external input lever right
52300	31	[MACH] Drive Joystick Right failure
52301	31	[MACH] Drive Joystick Left failure
52303	31	[MACH] Current PWM pump forward - the requested and measured currents differs more than allowed.
52304	31	[MACH] Current PWM pump backward - the requested and measured currents differs more than allowed.
52305	31	[MACH] Engine not detected
52306	31	[MACH] Engine CAN communication lost
52307	31	[MACH] Engine oil pressure low
52308	31	[MACH] Alternator error, P-terminal output not detected
52309	31	[MACH] Engine speed too high
52310	31	[MACH] Compaction module - No parameters
52311	31	[MACH] Compaction module - Invalid parameters
52312	31	[MACH] Compaction module - No calibration
52313	31	[MACH] Compaction module - No muru and Δφ
52314	31	[MACH] Compaction module - Pulse missing
52315	31	[MACH] Compaction module - Acceleration sensor error
52316	31	[MACH] Compaction module - Measurement overflow
52318	31	[MACH] ACE not calibrated
52319	31	[MACH] ACE CAN communication error

Caution

SPN	FMI	Error description
54000	31	[HINT] Seat switch open
54001	31	[HINT] Levers out of Parking Brake position
54002	31	[HINT] Immobiliser active

Messages displayed on the display

Displayed message	Description of the displayed message	Note
btnCAL	Calibration button pressed	
btn br	Brake test button pressed	
br tSt	Brake test active	
rA SEL	Ramp selection	
HArd	Hard ramp	
SoFt	Soft ramp	
tEMP	Temperature unit selection	
C	Celsius	
F	Fahrenheit	
LEFtLu	Left lever presence selection	
OFF	Off - left lever not present	
On	On - left lever present	
tc SEL	Rear drum type (tandem/combi) selection	
tAndEM	Tandem	
CoMbI	Combi	
Saue	Save (menu item)	
SAuIn9	Saving	
SAuEd	Saved	
btnOFF	Off button pressed	
Error	Error when saving new parameters values	
PUMP	Pump calibration (menu item)	
CUrr	Current in mA	Current (to the forward/reverse travel coil) during calibration, the value in [mA] is shown in the upper display
SUCC	Success	The calibration of minimum currents to travel coils successfully completed
FAIL	Failure	Error in the calibration of minimum currents to travel coils – values have not been changed
bAC	Back	One step back in the menu structure
UndEF	Undefined	Unspecified error (contact the service centre)
dPFErr	DPF error	No message about the DPF filter status received from the engine.

Wiring diagram

Legend:

A7 Gessmann right travel lever
S27 Vibration switch
S28 Sprinkling switch
S29 Edge cutter sprinkling switch
S30 Edge cutter selector

A9 Gessmann left travel lever
S31 Vibration switch
S32 Sprinkling switch
S33 Edge cutter sprinkling switch
S34 Edge cutter selector

A4 Bauser display
A1 Fuel gauge indicator (CAN)
A2 Voltage indicator
H1 ERROR indicator lamp (CAN)
H2 Charging indicator lamp (CAN)
H3 Engine oil pressure indicator lamp (CAN)
H4 Coolant temperature indicator lamp (CAN)
H5 Indicator lamp for hydraulic oil temperature (CAN)
H6 Emergency stop indicator lamp (CAN)
H7 Diesel fuel reserve indicator lamp (CAN)
H8 Engine glowing indicator lamp (CAN)
H9 Brake indicator lamp (CAN)
H10 Parking lights indicator lamp (CAN)
H11 Headlamps indicator lamp (CAN)
H12 Indicator lamp for direction indicators (CAN)

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

S2 Emergency brake button
S4 Sprinkling potentiometer
S5 Drive mode switch
S6 Automatic vibration switch
S7 Vibration switch, rear
S9 Headlamps switch
S10 Rear lights switch
S11 Warning lights switch
S12 Direction indicators switch
S15 Differential lock switch
S18 Seat switch
S20 Regeneration switch
S22 Brake pressure switch
S24 Horn switch
S25 Brake test switch
S26 Calibration switch
S40 Vibration mode switch
S41 Seatbelt switch
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X3, X4, X5 Engine connectors
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X30 Auxiliary power supply point
X35 Machine diagnostics socket
X36 Engine diagnostic socket
Y2 Brake valve electromagnet
Y3 Valve electromagnet, forward travel
Y4 Valve electromagnet, reverse travel
Y5 Vibration valve electromagnet, front
Y6 Vibration valve electromagnet, rear
Y7 Vibration valve electromagnet – big (ARX4)
Y8 Vibration valve electromagnet – small (ARX4)
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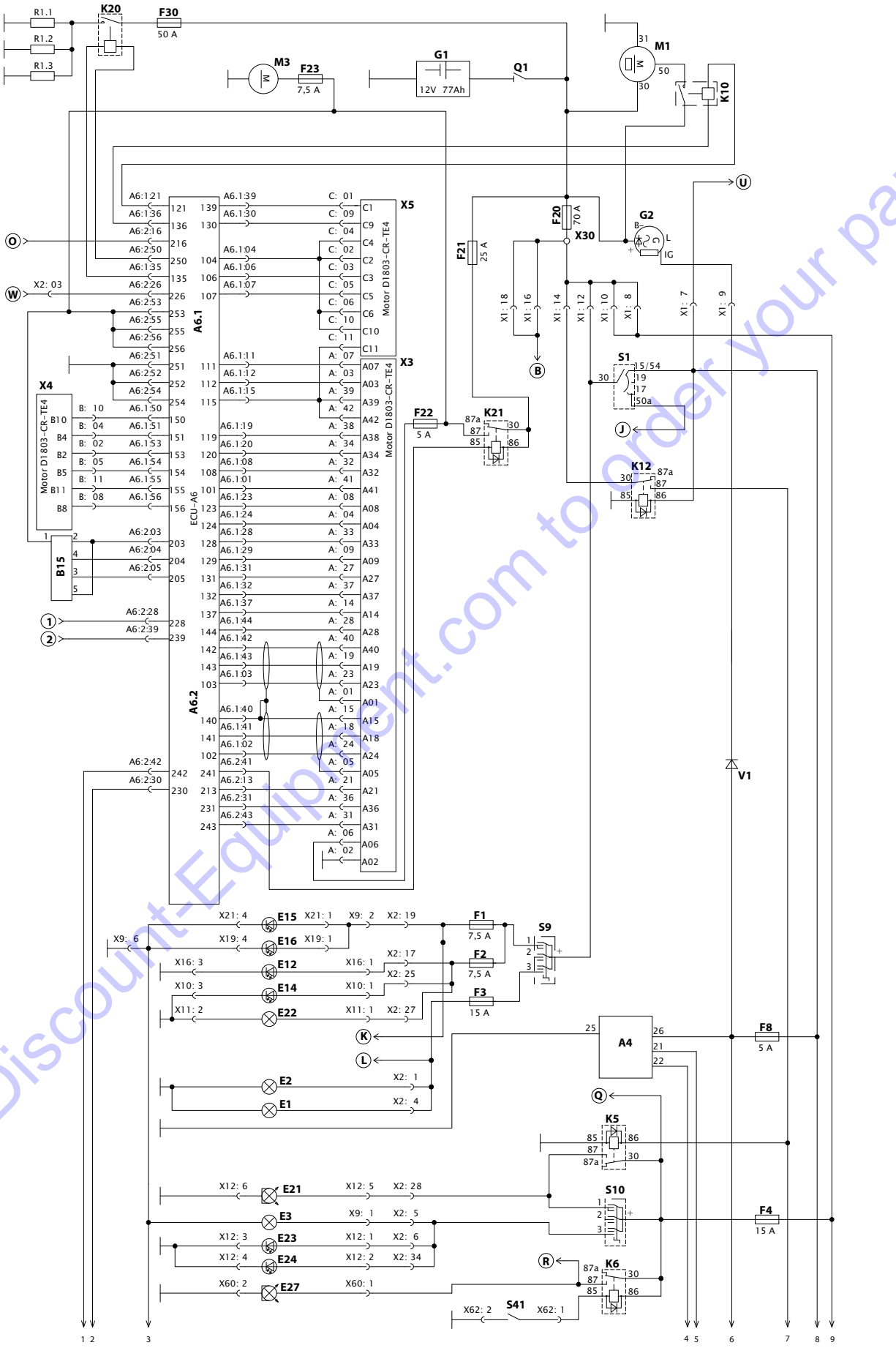
Y11 Quantity divider valve electromagnet
Y12 Valve electromagnet of the edge cutter – up
Y13 Valve electromagnet of the edge cutter – down
Y14 Valve electromagnet of the edge cutter – sprinkling



3.8 Appendix

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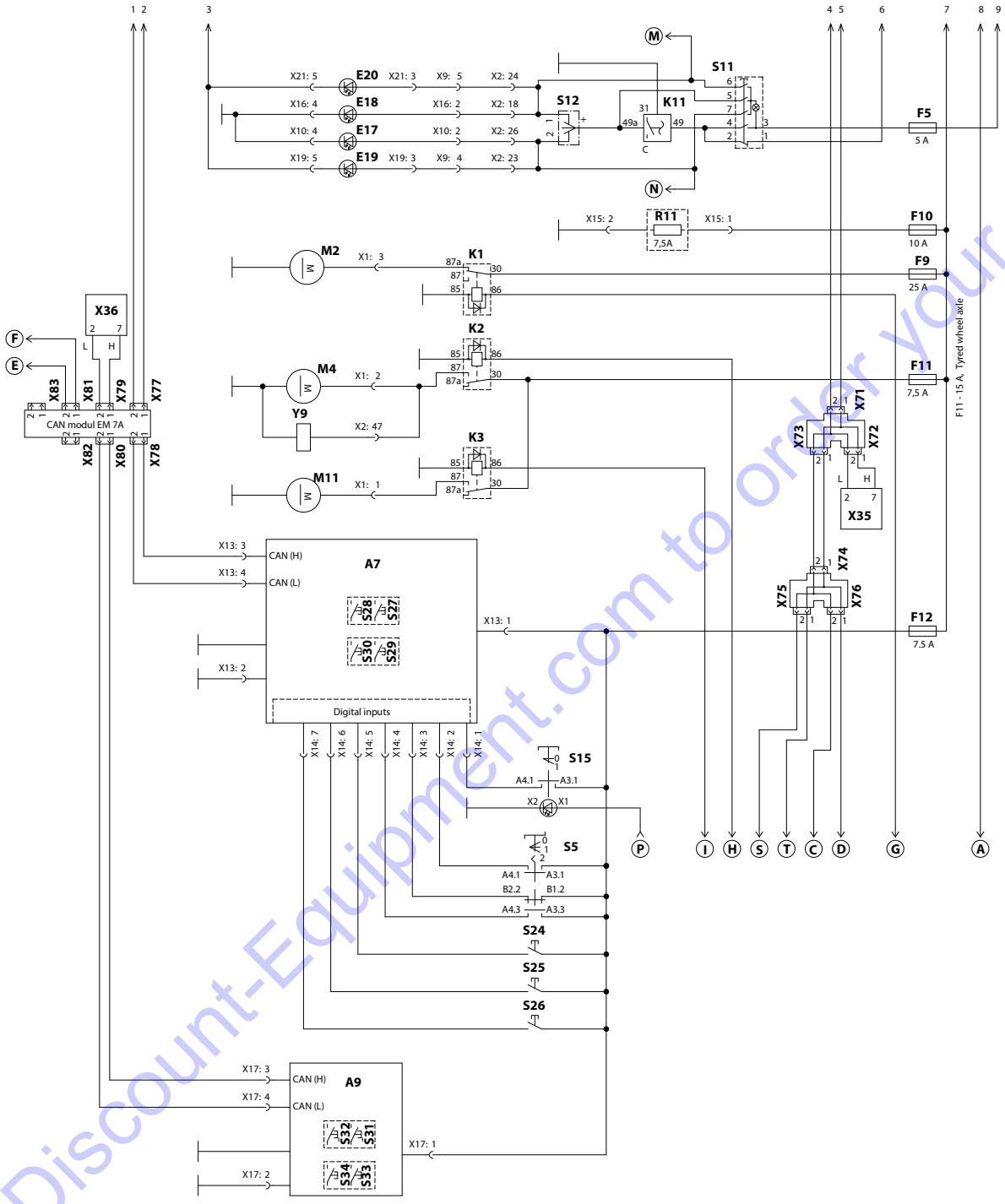
Y13 Valve electromagnet of the edge cutter – down
Y14 Valve electromagnet of the edge cutter – sprinkling



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3.8 Appendix

Wiring diagram

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S28 Sprinkling switch
S29 Edge cutter sprinkling switch
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S12 Direction indicators switch
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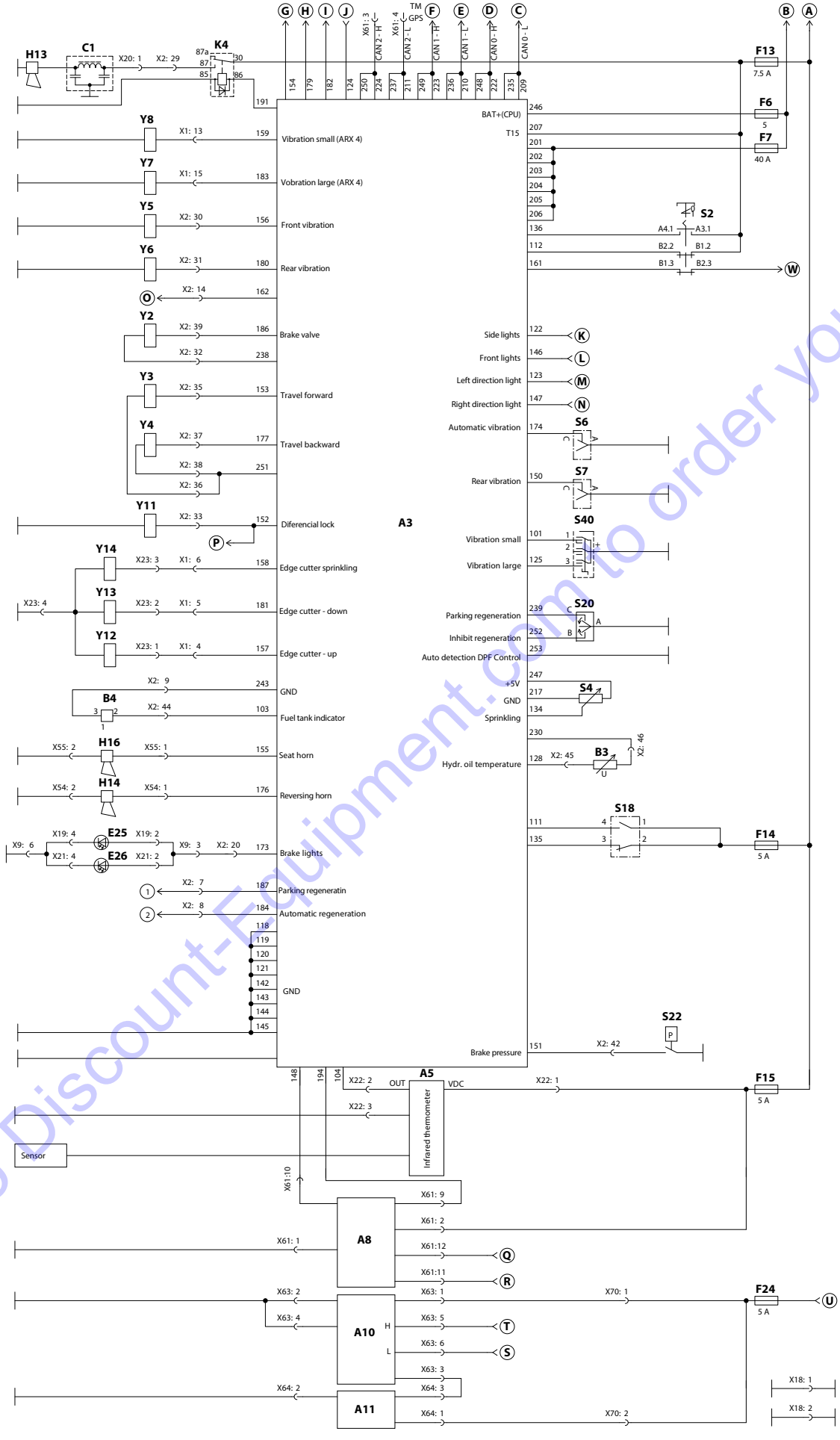
Y14 Valve electromagnet of the edge cutter – sprinkling

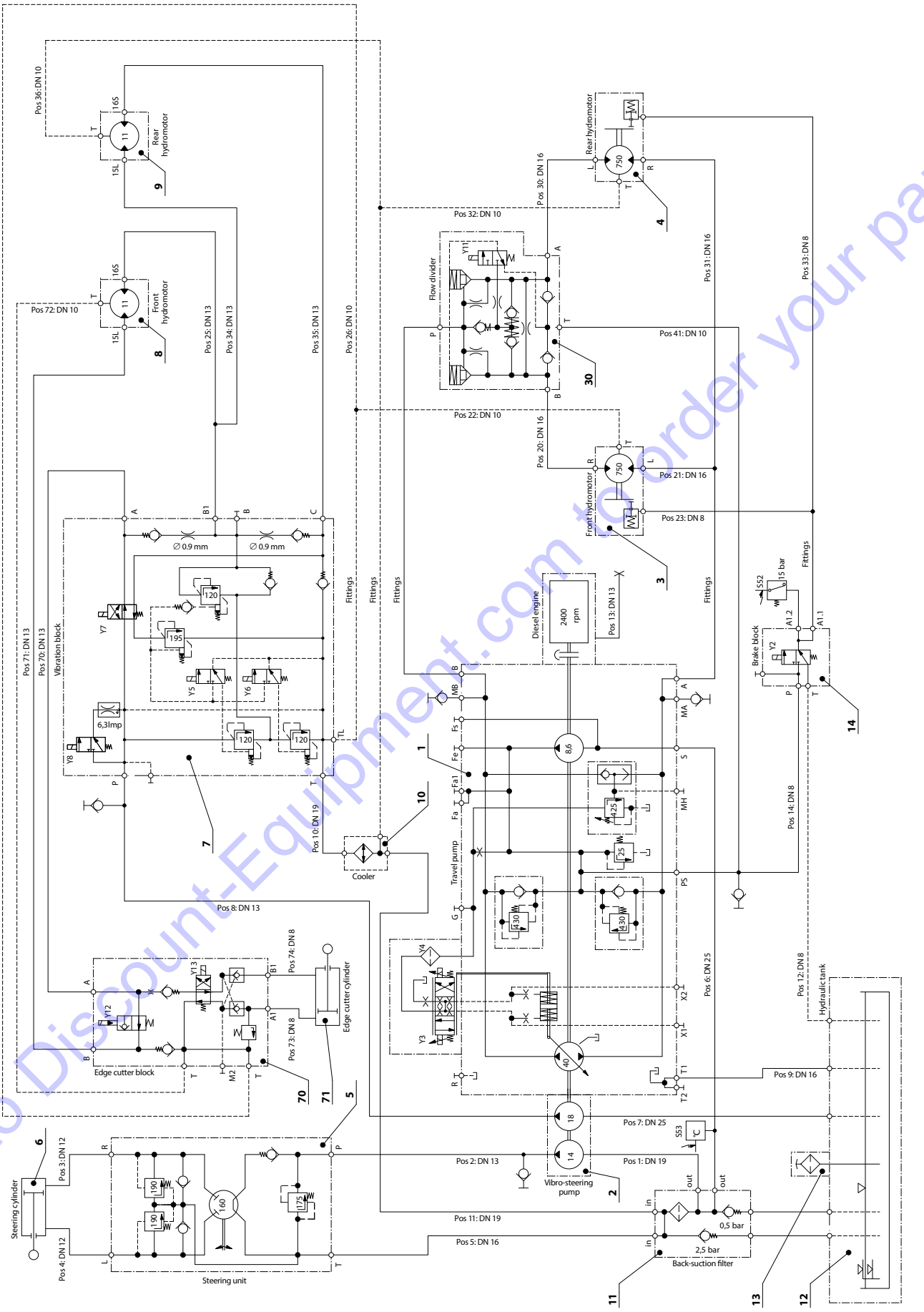


3.8 Appendix

Hydraulic diagram ARX 36-2, ARX 40-2, ARX 45-2

Legend:

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



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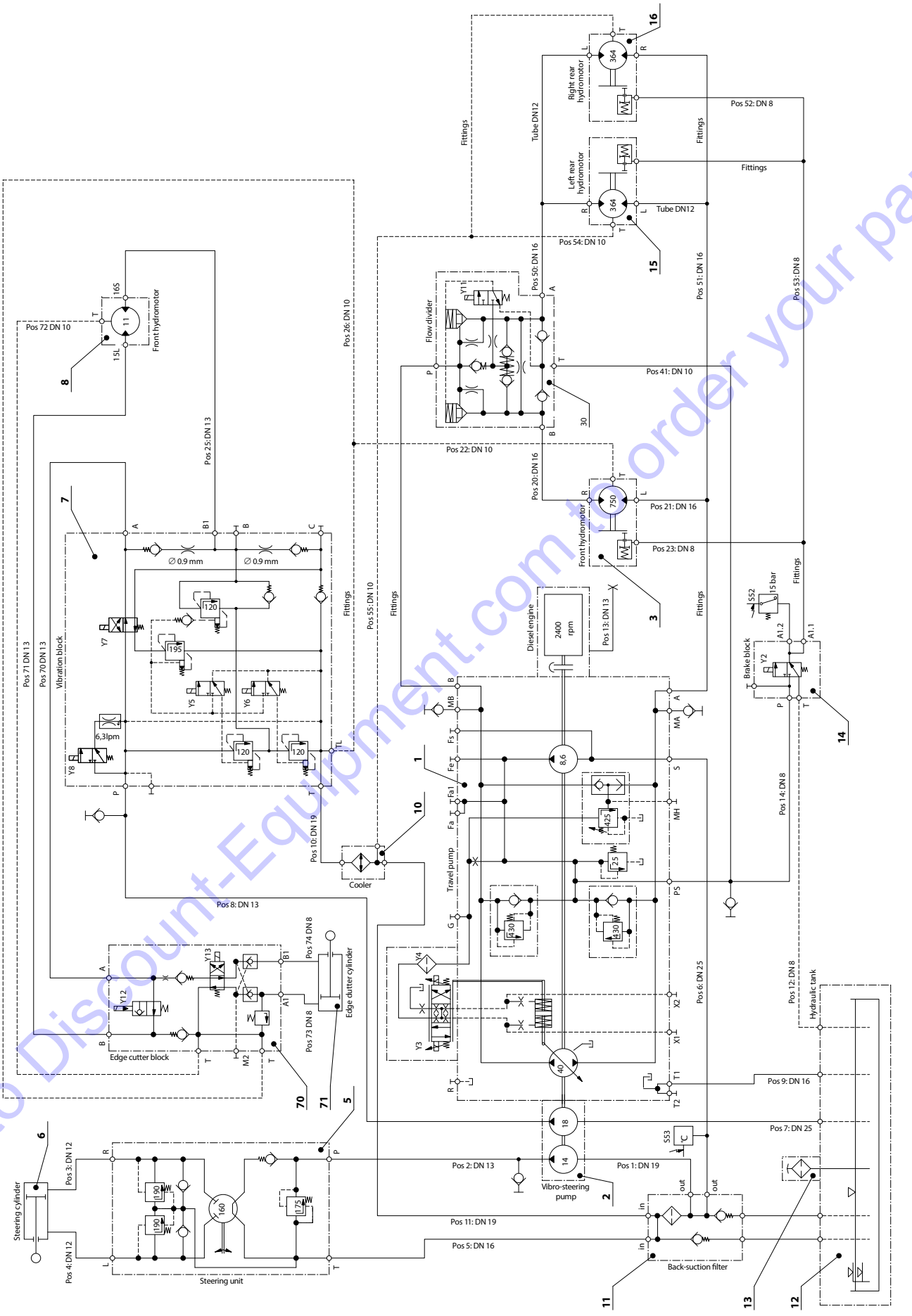
Hydraulic diagram ARX 40-2C, ARX 45-2C

Legend:

1 Travel pump
2 Pump, vibration, steering
3 Travel engine, front
5 Control unit
6 Steering cylinder
7 Vibration block
8 Vibration motor, front
10 Oil cooler
11 Suction return filter
12 Hydraulic oil tank
13 Input ventilation filter
14 Brake block
15 Rear left hydraulic motor
16 Rear right hydraulic motor
30 Flow divider
70 Edge cutter block
71 Edge cutter cylinder



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3.8 Appendix

Table of spare parts for regular maintenance

Chapter	Spare part	Order number
3.6.13	Fan	1448212
3.6.14	Jumper for the X8 connector	4-37570
3.6.17	Fuel filter cartridge	1503944
3.6.20	Fan	1448212
3.6.22	Engine oil filter	1504183
3.6.25	Fuel filter	1503943
3.6.27	Air filter cartridge, internal	1503941
3.6.27	Air filter cartridge, external	1503942
3.6.28	Fuel filter cartridge	1503944
3.6.29	Cooler rubber-metal	1448304
3.6.30	Hydraulic filter element	3-51629
3.6.30	Ventilation filter	1207934
3.6.31	Drum rubber-metal	1631985
3.6.42	Gas strut	1522243

Content of the filter set after 250 hours (4-760215)

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

Content of the filter set after 500 hours (4-760229)

Chapter	Spare part	Number of parts	Order number
3.6.17	Fuel filter cartridge	1	1503944
3.6.22	Engine oil filter	1	1504183
3.6.25	Fuel filter	1	1503943
3.6.27	Air filter cartridge, external	1	1503942
3.6.27	Air filter cartridge, internal	1	1503941

Content of the filter set after 1,000 hours (4-760230)

Chapter	Spare part	Number of parts	Order number
3.6.17	Fuel filter cartridge	1	1503944
3.6.22	Engine oil filter	1	1504183
3.6.25	Fuel filter	1	1503943
3.6.27	Air filter cartridge, internal	1	1503941
3.6.27	Air filter cartridge, external	1	1503942
3.6.30	Hydraulic filter element	1	3-51629
3.6.30	Ventilation filter	1	1207934
3.6.34	Oil separator filter cartridge	1	1521826

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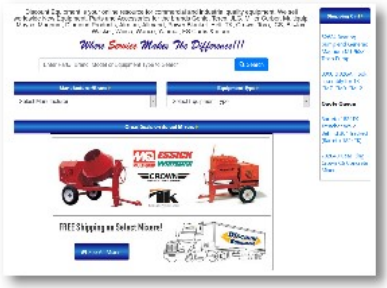

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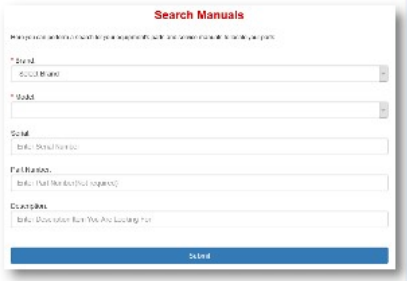

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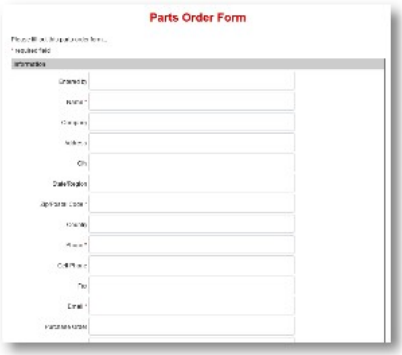

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