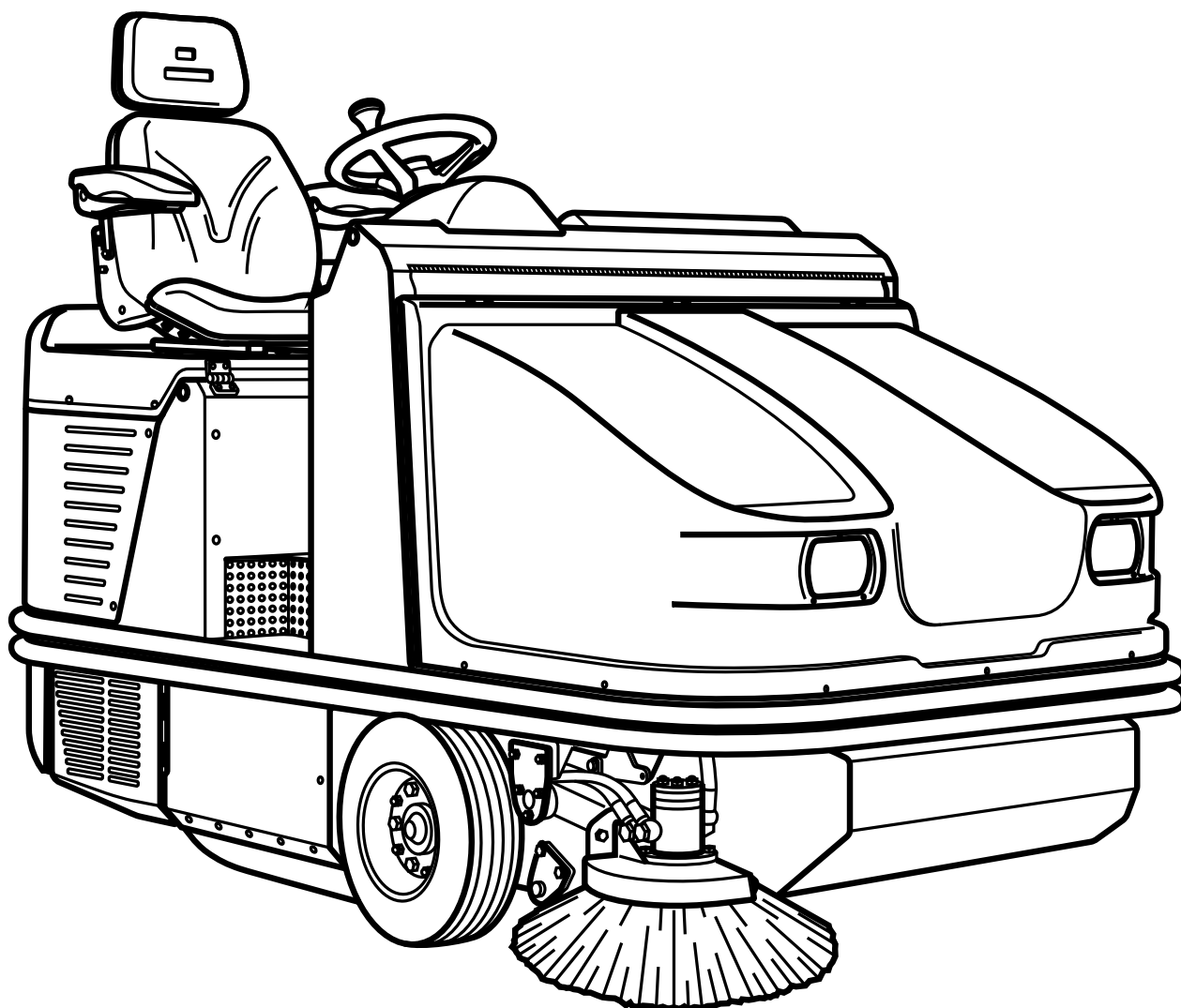




CS100- 120U-D-UF



PROFESSIONAL SWEEPING MACHINES

USE AND MAINTENANCE MANUAL

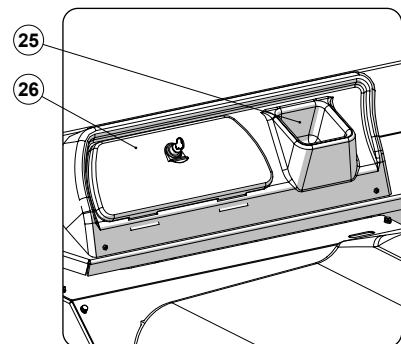
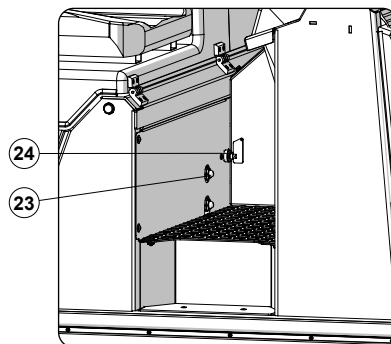
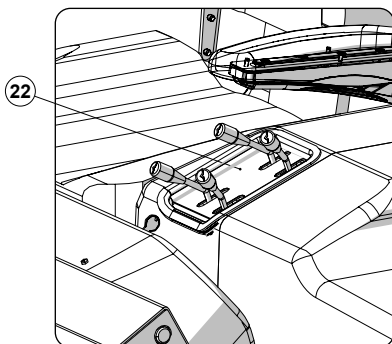
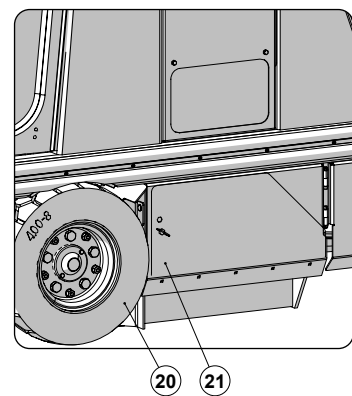
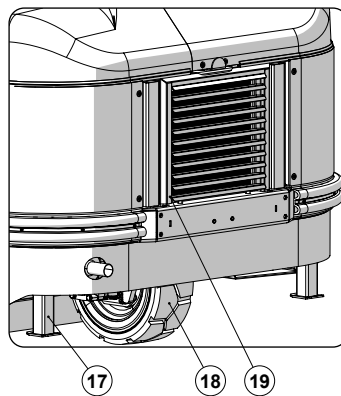
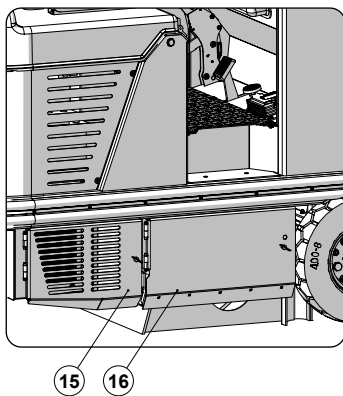
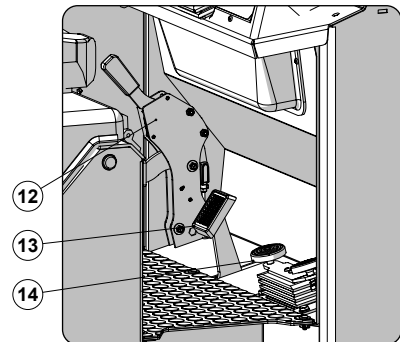
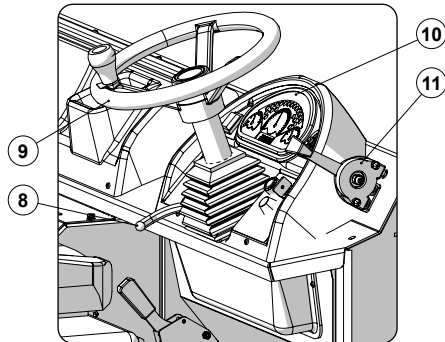
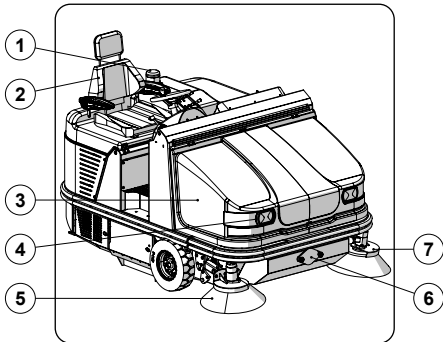


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LOCATION OF THE MAIN MACHINE COMPONENTS



The machine's main components are the following:

1. Blinking light.
2. Operator seat.
3. Body.
4. Headlight.
5. LH side brush.
6. Front vacuum kit.
7. RH side brush.
8. Steering wheel adjustment lever.
9. Steering wheel.
10. Instrument panel.
11. Accelerator adjustment lever.
12. Parking brake unit.
13. Service brake pedal.
14. Movement control pedal unit.
15. Inspection carter for hydraulic system filter.
16. RH side carter.
17. Roll-over protection support.
18. Traction wheel.
19. Rear radiator carter.
20. Front wheels.
21. LH side carter.
22. Debris hopper control unit.
23. Inspection window for hydraulic system oil level.
24. Safety switch.
25. Storage compartment.
26. Document compartment.

GENERAL DESCRIPTION

The descriptions contained in this document are not binding. The company therefore reserves the right to make any modifications at any time to elements, details, or accessory supply, as considered necessary for reasons of improvement or manufacturing/commercial requirements. The reproduction, even partial, of the text and drawings contained in this document is prohibited by law. **The company reserves the right to make any technical and/or supply modifications. The images are shown as reference only and are not binding as to the actual design and/or equipment.**

GENERAL SAFETY REGULATIONS

Before using the machine, please read the following document carefully and follow the instructions contained herein, along with the instructions in the document supplied with the machine itself, "GENERAL SAFETY REGULATIONS" (document code 10083659).

SYMBOLS USED IN THE MANUAL

	Open book symbol with an "i": Indicates the need to consult the instruction manual.
	Open book symbol: Tells the operator to read the user manual before using the device.
	Covered place symbol: The operations preceded by this symbol must always be carried out in a dry, covered area.
	Information symbol: Indicates additional information for the operator, to improve the use of the device.
	Warning symbol: Carefully read the sections preceded by this symbol meticulously following the instructions indicated for the safety of the operator and the device.
	Danger symbol (corrosive substances): The operator should always wear protective gloves to avoid the risk of serious injury to the hands caused by corrosive substances.
	Danger symbol (battery acid leakage): Indicates the danger of leaking acid or acid fumes from the batteries while they are being recharged.
	Danger symbol (moving trolleys): Indicates that the packed product should be handled with suitable trolleys that conform to legal requirements.
	Mandatory room ventilation symbol: Informs the operator that the room must be ventilated while the batteries are being recharged.
	Symbol indicating the compulsory use of protective gloves: Indicates that the operator should always wear protective gloves, to avoid the risk of serious injury to his hands from sharp objects.
	Recycling symbol: Tells the operator to carry out the operations in compliance with environmental regulations in force in the place where the appliance is being used.
	Disposal symbol: Carefully read the sections marked with this symbol for disposing of the appliance.

DEFINITION OF LEVELS OF WARNING

-  **DANGER:** indicates an imminent dangerous situation that, unless avoided, will result in death or serious injuries.
-  **WARNING:** Indicates a potentially dangerous situation that, unless avoided, could cause death or serious injury.
-  **ATTENTION:** Indicates a potentially dangerous situation that, unless avoided, could cause slight or moderate injuries.
-  **N.B.:** instructs the reader to pay particular attention to the topic that follows.

PURPOSE AND CONTENT OF THE MANUAL

The aim of this manual is to provide customers with all the information needed to use the machine in the safest, most appropriate and most autonomous way. This includes information concerning technical aspects, safety, operation, downtime, maintenance, spare parts and scrapping. The operators and qualified technicians must carefully read the instructions in this manual before carrying out any operations on the machine. If in doubt about the correct interpretation of instructions, contact your nearest COMAC Customer Service Centre to obtain the necessary clarifications.

TARGET GROUP

This manual is written both for operators and for qualified machine maintenance technicians. Operators must not perform operations that should be carried out by qualified technicians. The manufacturer is not liable for damages resulting from failure to comply with this veto.

PRESERVATION OF THE USER

The Use and Maintenance Manual must be stored in its special pouch close to the machine, protected from liquids and anything else that could compromise its legibility.

ON CONSIGNMENT OF THE MACHINE

At the time of delivery, it is essential to immediately check that all the material indicated on the accompanying documents has been consigned: this use and maintenance manual; the machine test certificate; the machine warranty certificate and the CD containing all the documents regarding the endothermic engine fitted on the machine.

Check also that the machine has not suffered any damage during transportation. If it has, the shipping agent must ascertain the extent of the damage at once and inform our Customer Service office. It is only by prompt action of this type that the missing material can be obtained, and compensation for damage successfully claimed.

INTRODUCTORY COMMENT

A sweeping machine can only function well and work effectively if it is used correctly and kept in full working order by carrying out the maintenance tasks described in the attached documentation. We therefore suggest you read this instruction booklet carefully and read it again whenever difficulties arise while using the machine. If necessary, remember that our assistance service (organised in collaboration with our dealers) is always available for advice or direct intervention.

IDENTIFICATION DATA

For technical assistance or to request replacement parts, always give the model, the version and the serial number (written on the relevant plate).

TECHNICAL DESCRIPTION

The **CS100** and **CS120** are ride-on sweeping machines powered by an electrical motor or an endothermic engine and designed to clean both indoor and outdoor flooring in tiles, cement or asphalt.

They must be used on dry surfaces, but can also work on wet surfaces if necessary as long as the vacuum is not activated.

The sweeping machine features a central brush for collecting brushed up material, one or two side brushes for cleaning along edges and in corners, a vacuum system with filter to avoid raising dust, and a debris hopper that is automatically moved by means of hydraulic pistons.

INTENDED USE

These sweeping machines are designed and built to clean both indoor and outdoor flooring in tiles, cement and asphalt. They are intended exclusively for professional use by a qualified operator in industrial, commercial and public contexts, in guaranteed safe conditions.

 **ATTENTION:** the sweeping machine is not designed to clean carpets or rugs. It is not suitable for use in closed places and should be used in open but covered areas (it must not be used in the rain or underneath jets of water).

 **IT IS FORBIDDEN:** to use the sweeping machine in places with an explosive atmosphere or to collect hazardous dust or inflammable liquids. In addition, it must not be used for transporting people or objects.

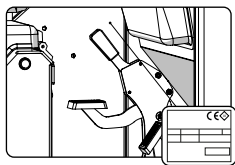
SAFETY

Operator cooperation is paramount for accident prevention. No accident prevention programme can be effective without the full cooperation of the person directly responsible for machine operation. The majority of occupational accidents that happen either in the workplace or whilst moving are caused by failure to respect the most basic safety rules. An attentive, careful operator is most effective guarantee against accidents and is fundamental in order to implement any prevention programme.

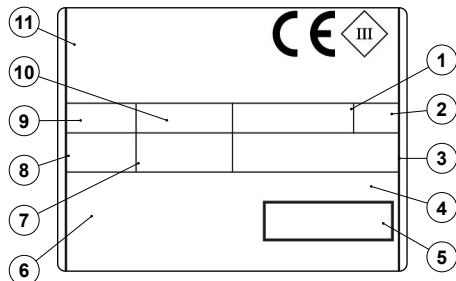
REGULATIONS

All references to forwards and backwards, front and rear, right and left indicated in this manual should be understood as referring to the operator in a driving position with his hands on the steering wheel.

SERIAL NUMBER PLATE



The serial number plate is located at the rear of the steering column, near the parking brake unit, and indicates the machine's general characteristics and its serial number. The serial number is a very important piece of information and should always be provided together with any request for assistance or when purchasing spare parts. The serial number plate contains the following:



1. The weight of the batteries that power the machine (battery-powered versions) (expressed in kg).
2. The IP protection rating of the machine.
3. The gross weight of the machine (expressed in kg).
4. The machine ID code.
5. The machine serial number.
6. The machine ID name.
7. The nominal power absorbed by the machine (expressed in kW).
8. The maximum grade that the appliance can handle during work activities (expressed in %).
9. The year of machine manufacture.
10. The nominal voltage of the machine (expressed in V).
11. The commercial name of the machine, and the manufacturer's address.

TECHNICAL DATA

TECHNICAL DATA	UM SI [KMS]	CS 100 B	CS 100 D	CS 120 B	CS 120 D	CS 120 BF
Nominal input power [IEC 60335-2-72; IEC 62885-9]	KW	6.5	-	6.5	-	-
Endothermic engine power	KW	-	21	-	21	21
Working gradeability GVW [IEC 60335-2-72; IEC 62885-9]	%	10	15	10	15	15
Gross weight GVW [IEC 60335-2-72; IEC 62885-9]	kg	1680	1070	1710	1100	1300
Weight during transport [IEC 60335-2-72; IEC 62885-9]	kg	960	1070	990	1100	1300
Sound pressure level on the operator's ears (Lp _A) [ISO 11201, ISO 4871, EN 60335-2-72]	dB (A)	71	84	71	84	84
Sound pressure level (Lw _A) [ISO 11201, ISO 4871, EN 60335-2-72]	dB (A)	93	102	93	102	102
Uncertainty Kp _A	dB (A)	±1.5	±1.5	±1.5	±1.5	±1.5
Vibration level on the operator's arms [ISO 5349-1, EN 60335-2-72]	m/s ²	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5
Vibration level on the operator's body [ISO 5349-1, EN 60335-2-72]	m/s ²	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Vibration measurement uncertainty		±1.5%	±1.5%	±1.5%	±1.5%	±1.5%

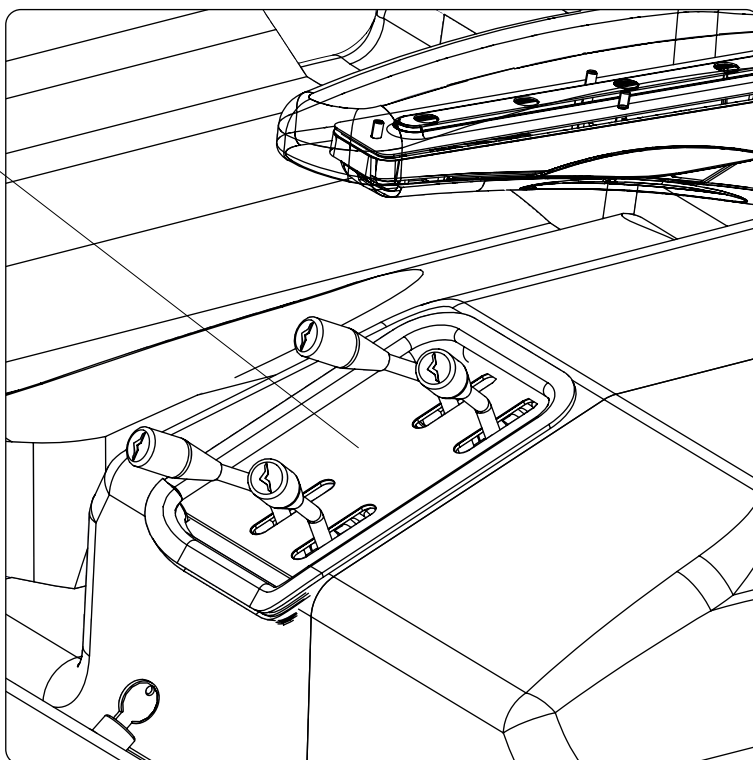
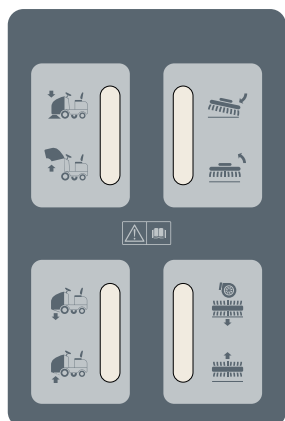
GENERAL LABELS

	Lifting hook label: Indicates where to screw in the eye bolts for safely lifting the machine.
	Label indicating the need to read the Use and Maintenance Manual: Indicates the need to read the use and maintenance manual before using the machine.
	Label showing prohibitions during machine use: Indicates the prohibitions that must be respected to ensure correct machine use.
	Label showing prohibition to bring hands near rotating parts: Indicates the prohibition to approach the brush head while the brush is moving.

	Label warning about the risk of crushed hands: Indicates danger to hands due to crushing between two surfaces.
	Label for hydraulic system oil level check: Located near the two hydraulic system oil level bulbs, to remind the operator to check the level of oil in the tank. The lower part of the label shows the recommended oil for the hydraulic system.
	Label for minimum hydraulic system oil level: Located on the battery compartment closure panel, to indicate the minimum safe level; if the level in the machine's hydraulic system is lower, it must be topped up.
	Label for maximum hydraulic system oil level: Located on the battery compartment closure panel, to indicate the maximum safe level; if the level in the machine's hydraulic system is higher, the excess must be drained off.
	Braking system oil level check label: Located near the braking system oil basin, to remind the operator to check the level of oil in the basin. The bottom part of the label shows the recommended oil for the braking system.
	Parking brake lever label: Located near the operator seat, to identify the command lever of the parking brake.
	Label for the forward drive pedal: Located near the operator's seat, to indicate the pedal used to move the machine forwards.
	Label for the reverse pedal: Located near the operator's seat, to indicate the pedal used to move the machine backwards.
	Label for central brush pressure adjustment: Located on the left-hand side of the machine, to indicate the knob for adjusting the pressure exerted on the ground by the central brush.
	14V label (battery-powered versions): Located inside the machine, to indicate which cables are powered at 14V.
	Label for the battery recharging sequence (battery-powered versions): Indicates the sequence for recharging the batteries correctly.
	Label with battery recharging warning (battery-powered versions): Indicates that attention needs to be paid when recharging the batteries.
	Label with guaranteed sound power level L_{wA} (versions with endothermic engine): Located near the operator's seat, showing the sound power level (L_{wA}) - 103dB.
	Symbol for endothermic engine speed adjustment control (versions with endothermic engine): Located on the control panel, to indicate the speed adjustment lever for the endothermic engine.
	Battery cut-out label (versions with endothermic engine): Located on the battery compartment closure panel, to indicate the battery cut-out switch.
	Label showing prohibition to approach with naked flames (versions with endothermic engine): Located near the endothermic engine fuel tank, to indicate the prohibition to approach with any type of naked flame.

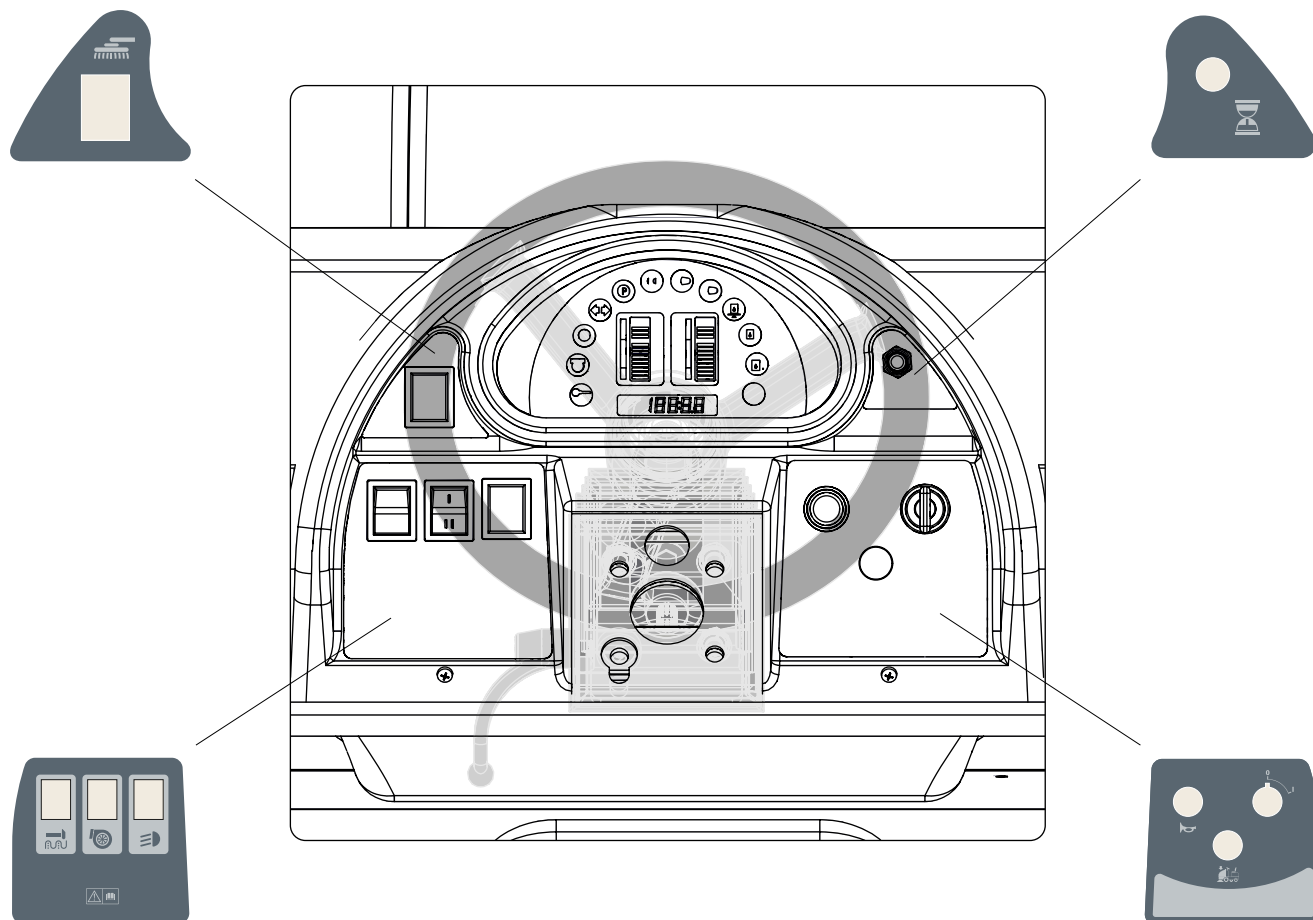
	Label showing prohibition to put out fires with water (versions with endothermic engine): Located near the endothermic engine fuel tank, to indicate the prohibition to put out fires using water.
	Label indicating the risk of burns (versions with endothermic engine): Located near the endothermic engine, to indicate the risk of burns if certain surfaces are touched.
	Label calling for attention to hazard of moving belt and fan (versions with endothermic engine): Located near the endothermic engine radiator, to indicate that the radiator fan and fan belt are moving and could pose a serious risk of injury to the limbs.
	Label warning not to inhale the exhaust gases from the endothermic engine (versions with endothermic engine): Located near the operator's seat, warning not to inhale the exhaust gases produced by the endothermic engine.
 DIESEL	Label for the fuel tank cap on the endothermic engine (versions with endothermic diesel engine): Located above the fuel tank cap, to indicate that the fuel used in the endothermic engine is diesel.
	Label for the fuel tank cap on the endothermic engine (versions with endothermic LPG engine): Located above the fuel tank cap, to indicate that the primary fuel used in the endothermic engine is petrol.
	Endothermic engine starter command symbol (versions with endothermic LPG engine): Located on the control panel, to indicate the endothermic engine starter command lever.
	Bi-fuel engine starter command label (versions with endothermic LPG engine): Located near the steering column, to warn that the starter command lever must only be used when the endothermic engine needs to be started up in diesel mode.
	Label for the endothermic engine fuel type selector (versions with endothermic LPG engine): Located near the control panel, to indicate the selector switch for the type of endothermic engine fuel supply.
	Label for explosive compressed gas hazard (versions with endothermic LPG engine): Located near the LPG cylinder supports, to indicate that the cylinder contains a compressed and highly explosive gas.
	Label with obligation to fix the LPG cylinder (versions with endothermic LPG engine): Located near the LPG cylinder supports, to indicate the obligation to secure the cylinder using the appropriate fastening elements.
	Pressure level label for front tyres (versions with pneumatic tyres): Located near the front wheels, to indicate the tyre pressure needed to obtain the best results.
	Pressure level label for rear tyre (versions with pneumatic tyres): Located near the rear wheel, to indicate the tyre pressure needed to obtain the best results.

CONTROL PANEL LABEL



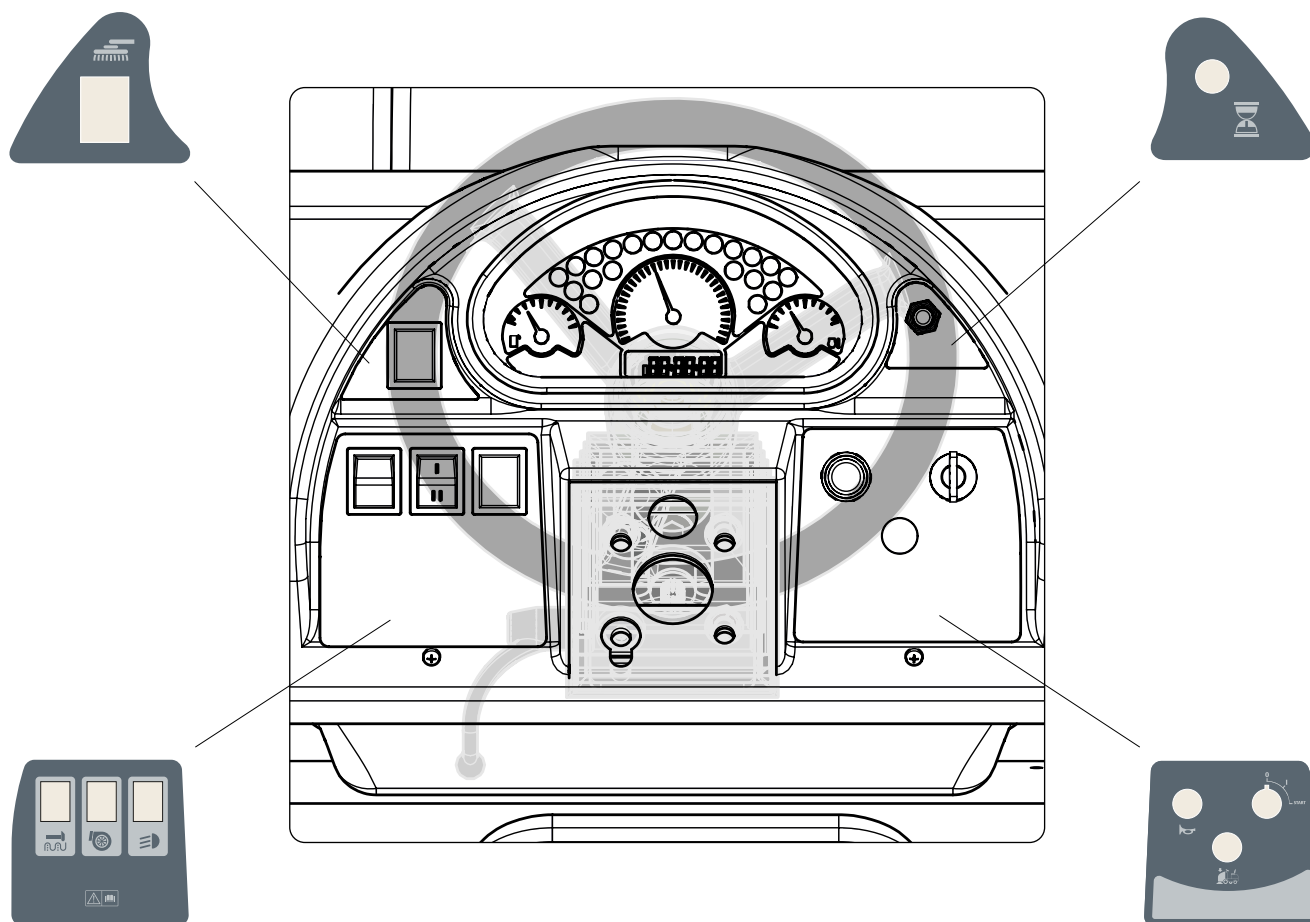
	Debris hopper movement symbol: Located on the instrument panel, to indicate the safety button that controls the movement of the debris hopper.
	Label for debris hopper “dumping position” command lever: Located on the control panel, to indicate the correct lever position for rotating the debris hopper to its dumping position.
	Label for side brush “work position” command lever: Located on the control panel, to indicate the correct lever position for bringing the side brush into contact with the ground (work position).
	Label for side brush “idle position” command lever: Located on the control panel, to indicate the correct lever position for raising the side brush off the ground (idle position).
	Label for central brush “work position” command lever: Located on the control panel, to indicate the correct lever position for bringing the central brush into contact with the ground (work position).
	Label for central brush “idle position” command lever: Located on the control panel, to indicate the correct lever position for raising the central brush off the ground (idle position).
	Label for debris hopper hatch opening command lever: Located on the control panel, to indicate the correct lever position for opening the debris hopper hatch (work position).
	Label for debris hopper hatch closing command lever: Located on the control panel, to indicate the correct lever position for closing the debris hopper hatch (idle position).

INSTRUMENT PANEL LABELS (BATTERY VERSIONS)



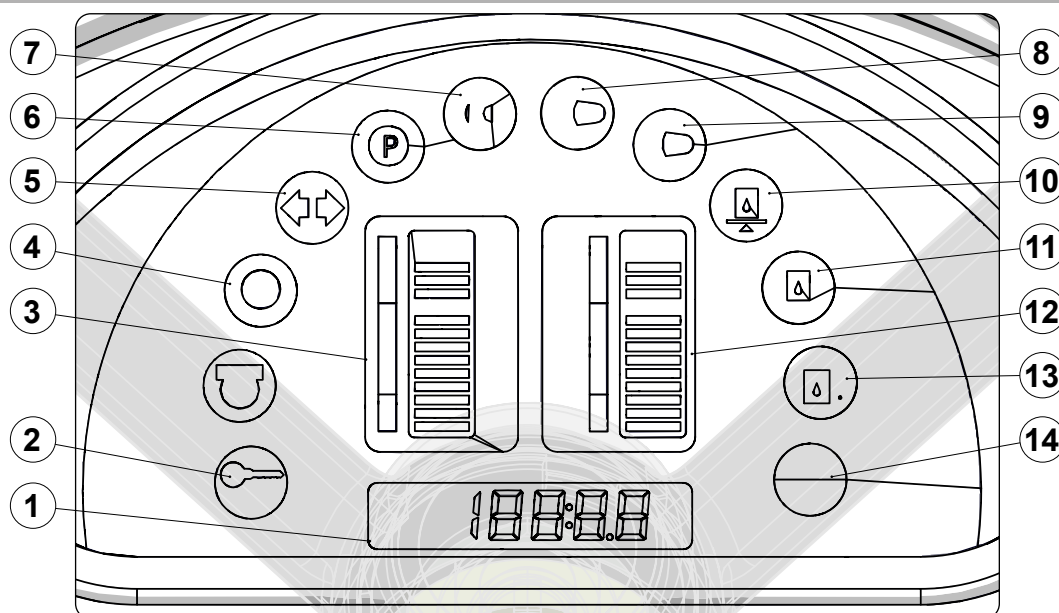
	Label for LH side brush activation (optional feature on versions with LH side brush): Located on the control panel, to indicate the LH side brush activation/deactivation switch.
	Symbol for total/partial work hours: Located on the instrument panel, to indicate the button for displaying the total and partial work hours.
	Main switch symbol: Located on the instrument panel, to indicate the key switch for machine ON (I) or OFF (0).
	Hopper down label: Located on the instrument panel, to indicate the safety button for lowering the debris hopper.
	Horn symbol: Located on the instrument panel, to indicate the horn button.
	Headlight symbol: Located on the instrument panel, to indicate the button that switches the machine headlights on and off.
	Vacuum turbine label: Located on the control panel, to indicate the machine's vacuum turbine command switch.
	Filter shaker symbol: Located on the instrument panel, to indicate the button that activates the filter shaker on the filter unit.

INSTRUMENT PANEL LABELS (VERSIONS WITH ENDOTHERMIC ENGINE)



	Label for LH side brush activation (optional feature on versions with LH side brush): Located on the control panel, to indicate the LH side brush activation/deactivation switch.
	Symbol for total/partial work hours: Located on the instrument panel, to indicate the button for displaying the total and partial work hours.
	Main switch symbol: Located on the instrument panel, to indicate the key switch for machine ON (I), OFF (0) or start-up pulse (START).
	"Operator present" label: Located on the control panel, to indicate the "operator present" button.
	Horn symbol: Located on the instrument panel, to indicate the horn button.
	Headlight symbol: Located on the instrument panel, to indicate the button that switches the machine headlights on and off.
	Vacuum turbine label: Located on the control panel, to indicate the machine's vacuum turbine command switch.
	Filter shaker symbol: Located on the instrument panel, to indicate the button that activates the filter shaker on the filter unit.

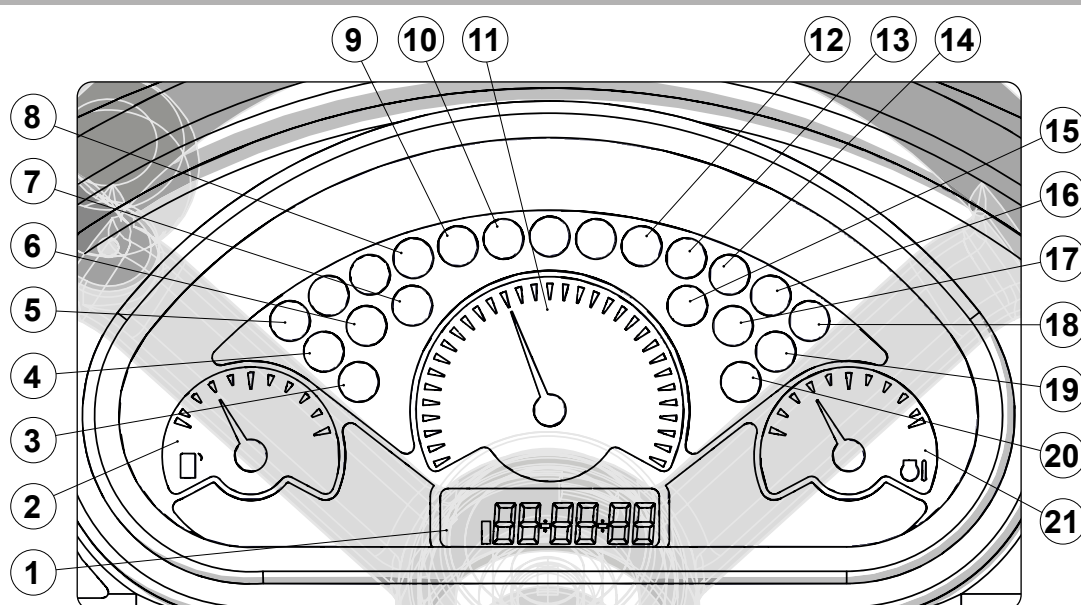
INSTRUMENT PANEL SYMBOLS (BATTERY VERSIONS)



1		Digital display for total/partial work hours: Located on the instrument panel, to indicate the digital display showing the total or partial work hours.
2		Symbol for main switch ON: Located on the instrument panel, to indicate the green light showing that the main key switch is enabled.
3		Graphic display for battery charge level: Located on the instrument panel, to indicate the graphic display showing the battery charge level.
4		Symbol for braking system pressure fault Located on the instrument panel, to indicate the red warning light showing a lack of oil in the work braking system.
5		Symbol for active indicator lights (street versions): Located on the instrument panel, to indicate the green light showing that the indicator lights are working.
6		Parking brake symbol: Located on the instrument panel, to indicate the red warning light showing that the parking brake is engaged.
7		Symbol for active side lights (street versions): Located on the instrument panel, to indicate the green light showing that the side lights are enabled.
8		Symbol for active high beam lights (street versions): Located on the instrument panel, to indicate the blue warning light showing that the high beam lights are enabled.
9		Symbol for active headlights: Located on the instrument panel, to indicate the green light showing that the headlights (dipped lights) are enabled.
10		Symbol for critical hydraulic system oil level: Located on the instrument panel, to indicate the red warning light showing that the oil in the hydraulic system has reached a critical level for correct machine operation.

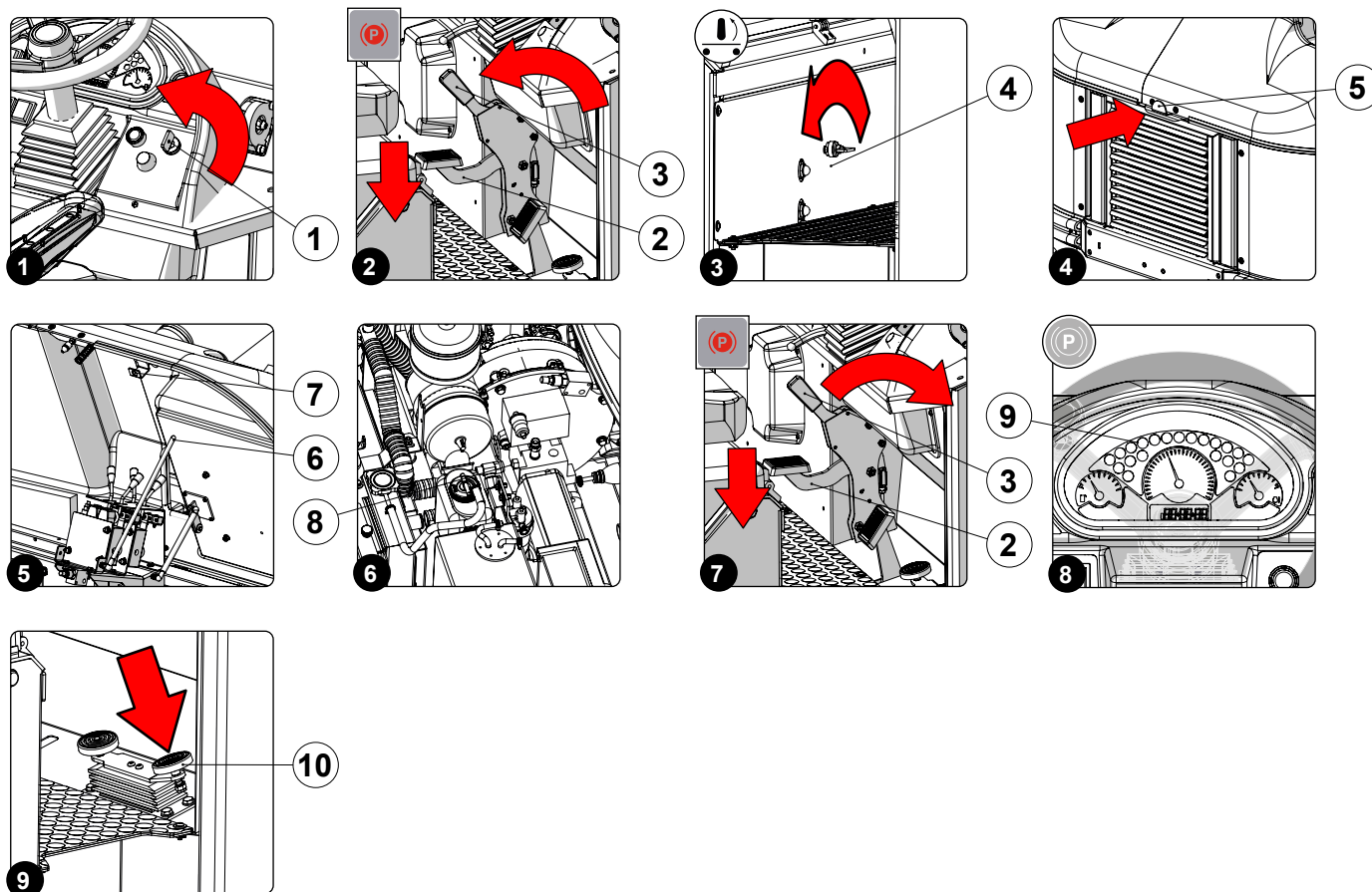
11		Symbol for clogged hydraulic system filter: Located on the instrument panel, to indicate the red warning light showing that the oil filter in the hydraulic system is clogged, jeopardising correct machine operation.
12		Graphic display for current absorption: Located on the instrument panel, to indicate the graphic display showing the machine's current absorption.
13		Symbol for critical hydraulic system oil temperature: Located on the instrument panel, to indicate the red warning light showing that the oil in the hydraulic system has reached a temperature that is jeopardising correct machine operation.
14		Symbol for debris hopper hatch open: Located on the instrument panel, to indicate the green light showing that the hatch of the debris hopper is open.

INSTRUMENT PANEL SYMBOLS (VERSIONS WITH ENDOTHERMIC ENGINE)



1		Digital display for total/partial work hours: Located on the instrument panel, to indicate the digital display showing the total or partial work hours.
2		Analogue fuel level display: Located on the instrument panel, to indicate the analogue display showing the level of fuel in the machine tank.
3		Symbol for active indicator lights (street versions): Located on the instrument panel, to indicate the green light showing that the indicator lights are working.
4		Symbol for active high beam lights (street versions): Located on the instrument panel, to indicate the blue warning light showing that the high beam lights are enabled.
5		Insufficient fuel level symbol: Located on the instrument panel, to indicate the yellow light showing that the level of fuel in the fuel tank is low.
6		Symbol for active headlights: Located on the instrument panel, to indicate the green light showing that the headlights (dipped lights) are enabled.

7		Symbol for active side lights (street versions): Located on the instrument panel, to indicate the green light showing that the side lights are enabled.
8		Parking brake symbol: Located on the instrument panel, to indicate the red warning light showing that the parking brake is engaged.
9		Alternator malfunction symbol: Located on the instrument panel, to indicate the red warning light showing that the alternator in the machine is not working properly.
10		Symbol for braking system pressure fault Located on the instrument panel, to indicate the red warning light showing a lack of oil in the work braking system.
11		Analogue display for endothermic engine speed: Located on the instrument panel, to indicate the analogue display showing the speed of the machine's endothermic engine.
12		Symbol for debris hopper hatch closed: Located on the instrument panel, to indicate the red warning light showing that the hatch of the debris hopper is closed.
13		Symbol for debris hopper hatch open: Located on the instrument panel, to indicate the green light showing that the hatch of the debris hopper is open.
14		Symbol for critical hydraulic system oil temperature: Located on the instrument panel, to indicate the red warning light showing that the oil in the hydraulic system has reached a temperature that is jeopardising correct machine operation.
15		Symbol for critical hydraulic system oil level: Located on the instrument panel, to indicate the red warning light showing that the oil in the hydraulic system has reached a critical level for correct machine operation.
16		Symbol for excessively high coolant temperature in the cooling system: Located on the instrument panel, to indicate the red warning light showing that the coolant in the endothermic engine cooling system has reached an excessively high temperature.
17		Symbol for clogged hydraulic system filter: Located on the instrument panel, to indicate the red warning light showing that the oil filter in the hydraulic system is clogged, jeopardising correct machine operation.
18		Glowplug symbol: Located on the instrument panel, to indicate the yellow light showing that the glowplugs are in the pre-heating phase for optimum endothermic engine switch-on.
19		Symbol for clogged air filter on endothermic engine inlet: Located on the instrument panel, to indicate the red warning light showing that the air filter on the endothermic engine inlet is clogged.
20		Symbol for low endothermic engine oil pressure: Located on the instrument panel, to indicate the red warning light showing that the oil pressure level in the endothermic engine hydraulic system is too low.
21		Analogue display for coolant temperature level in the cooling system: Located on the instrument panel, to indicate the analogue display showing the temperature of the coolant in the engine cooling system.



HANDLING THE PACKAGED MACHINE

The overall dimensions and weight of the package are:

MODEL	DIMENSIONS (mm)	WEIGHT (Kg)
CS 100 B	2330x1640x1790	1030
CS 100 D	2330x1640x1790	1140
CS 120 B	2330x1640x1790	1060
CS 120 D	2330x1640x1790	1170
CS 120 BF	2330x1640x1790	1170

i **N.B.:** it is recommended that all the packaging components be kept for any future machine transportation.

⚠ DANGER: Move the packaged product with handling trolleys that comply with legal requirements regarding size and mass of the packaging.

HOW TO UNPACK THE MACHINE

The machine is shipped in specific packaging. To remove it, proceed as follows:

1. Place the lower part of the outer packaging in contact with the floor.

i **N.B.:** use the pictograms printed on the box as a reference.

2. Remove the outer package.

⚠ WARNING: the machine is contained in specific packaging materials, whose elements (plastic bags, staples, etc.) can pose potential hazards, and must not be left within reach of children, disabled persons, etc.

⚠ WARNING: It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out.

3. Insert a ramp in the rear part of the machine.

⚠ ATTENTION: the ramp gradient must not be such as to cause damage to the machine as it comes down.

4. The machine is secured to the footboard with wedges that lock the wheels, remove these wedges.
5. Sit on the operator's seat and check that the main switch is set to "0". If it isn't, make a quarter turn anti-clockwise with the key (1) (**Fig.1**). Remove the key from the instrument panel.
6. Check that the parking brake is engaged. If it isn't, press the pedal (2) and turn the lever (3) anti-clockwise (**Fig.2**). The lever is located next to the operator's seat.
7. For versions with a combustion engine, make a quarter turn anti-clockwise with the battery cut-out lever (4) (**Fig.3**).
8. Go to the back of the machine and open the tailgate by pressing the lever (5) (**Fig.4**).
9. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (6) in the hole (7) on the tailgate (**Fig.5**).

⚠ WARNING: the following operations must be carried out by qualified personnel.

10. For battery-powered versions, disconnect the battery connector from the machine's main system connector.
11. Loosen the nut (8) on the bypass valve by one complete turn (**Fig.6**), to put the hydraulic system in standby.

🔧 N.B.: The necessary equipment is not supplied with the machine.

12. Rotate the tailgate back to its normal position, remembering to remove the rotation retainer pin (7) from the hole (6) before closing the tailgate (**Fig.5**).
13. Sit on the driver's seat.
14. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.7**). The lever is located next to the operator's seat.
15. Drive the machine down the ramp.

⚠ ATTENTION: during this operation, check there are no people or objects near the machine.

MACHINE SAFETY

The procedure for securing the machine, thus allowing the operations to be performed under conditions of complete safety, is as follows:

1. Make sure the debris hopper is empty. If it isn't, empty it completely. See "EMPTYING THE DEBRIS HOPPER" on page 42.
2. Engage the parking brake and press the pedal (2), turning the lever (3) anti-clockwise (**Fig.7**). The lever is located next to the operator's seat.

🔧 N.B.: As soon as the parking brake is engaged, the relative red warning light (8) will be illuminated on the instrument panel (**Fig.8**).

3. Bring the main switch to its "0" position by turning the key (1) a quarter turn anti-clockwise (**Fig.1**). Remove the key from the instrument panel.
4. For versions with a combustion engine, make a quarter turn anti-clockwise with the battery cut-out lever (4) (**Fig.3**).
5. For battery-powered versions, get off the machine. Go to the back of the machine and open the tailgate by pressing the lever (5) (**Fig.4**).
6. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (6) in the hole (7) on the tailgate (**Fig.5**).

⚠ WARNING: the following operations must be carried out by qualified personnel.

7. Disconnect the battery connector from the machine's general system connector.
8. Rotate the tailgate back to its normal position, remembering to remove the rotation retainer pin (7) from the hole (6) before closing the tailgate (**Fig.5**).

HOW TO MOVE THE MACHINE

The procedure for transporting the machine safely is as follows:

⚠ DANGER: before starting any task, make sure the current regulations concerning the safe transport of dangerous substances are scrupulously observed.

1. Make sure the debris hopper is empty. If it isn't, empty it completely. See "EMPTYING THE DEBRIS HOPPER" on page 42.
2. Sit on the operator's seat and switch on the machine (read "SWITCHING ON THE MACHINE" on page 30).
3. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.7**). The lever is located next to the operator's seat.

🔧 N.B.: As soon as the parking brake is disengaged, the relative red warning light (9) will be illuminated on the instrument panel (**Fig.8**).

4. Press the drive pedal (10) to begin moving the machine (**Fig.9**).

🔧 N.B.: Press the right-hand pedal to move the machine forwards, or the left-hand one to go backwards.

5. Use a ramp to move the machine up onto the transport vehicle.

 **CAUTION:** during this operation, check there are no people or objects near the machine.

 **N.B.:** the ramp gradient must not be such as to cause damage to the machine as it goes up.

6. Once the machine is positioned on the means of transport, carry out the steps required to secure the machine (read "MACHINE SAFETY" on page 18).

 **WARNING:** secure the machine in accordance with the regulations in force in the country of use, so it cannot slip or overturn. Check the TECHNICAL DATA table to see the gross (transportation) weight of the machine.

HANDLING THE MACHINE WITHOUT PACKAGING

The procedure for handling the unpackaged machine safely is as follows:

1. Make sure the debris hopper is empty. If it isn't, empty it completely. See "EMPTYING THE DEBRIS HOPPER" on page 42.
2. Check the main switch is on "0". If it isn't, make a quarter turn anti-clockwise with the key (1) (**Fig.1**). Remove the key from the instrument panel.
3. Check that the parking brake is engaged. If it isn't, press the pedal (2) and turn the lever (3) anti-clockwise (**Fig.2**). The lever is located next to the operator's seat.
4. For versions with a combustion engine, make a quarter turn anti-clockwise with the battery cut-out lever (4) (**Fig.3**).
5. Go to the back of the machine and open the tailgate by pressing the lever (5) (**Fig.4**).
6. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (6) in the hole (7) on the tailgate (**Fig.5**).

 **WARNING:** the following operations must be carried out by qualified personnel.

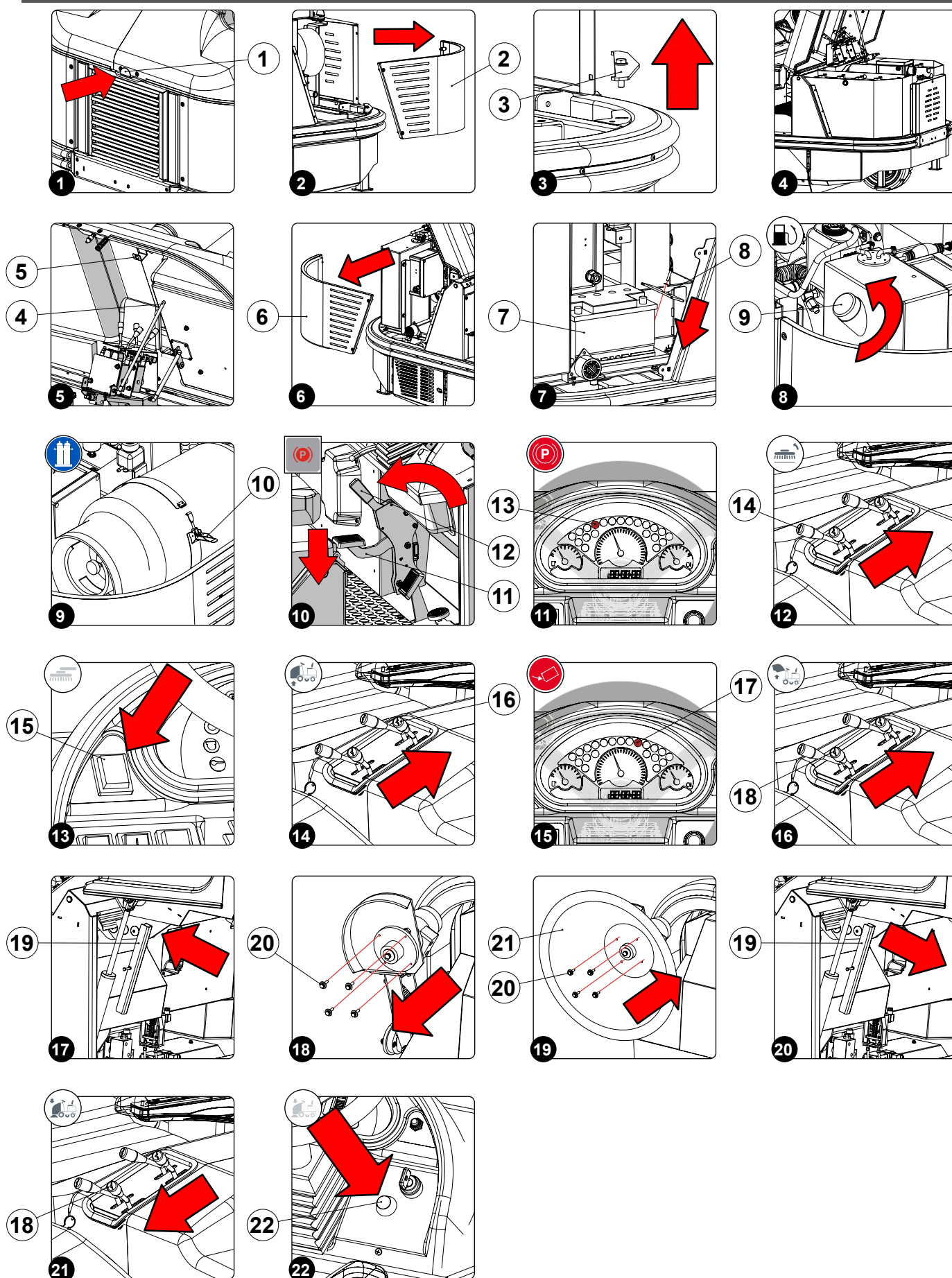
7. For battery-powered versions, disconnect the battery connector from the machine's main system connector.
8. Loosen the nut (8) on the bypass valve by one complete turn (**Fig.6**), to put the hydraulic system in standby.

 **N.B.:** The necessary equipment is not supplied with the machine.

9. Rotate the tailgate back to its normal position, remembering to remove the rotation retainer pin (7) from the hole (6) before closing the tailgate (**Fig.5**).
10. Sit on the driver's seat.
11. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.7**). The lever is located next to the operator's seat.
12. Push the machine.

 **ATTENTION:** during this operation, check there are no people or objects near the machine.

PREPARATION OF MACHINE



TYPE OF BATTERY CASE TO BE USED (BATTERY VERSIONS)

The battery cases used must meet the requisites laid out in the following standards: DIN EN 50272-3. **To carry out the work effectively, the machine must have a 36V power supply**; we recommend using two traction battery boxes with positive tubular plate elements, type PzM / PzMB (18V 640Ah/C₅).

BATTERY MAINTENANCE AND DISPOSAL (BATTERY-POWERED VERSIONS)

For battery maintenance and recharging, respect the instructions provided by the battery manufacturer.

When the batteries reach the end of their service life, they must be disconnected by a COMAC assistance centre technician or by a specialised and properly trained worker, and must be subsequently removed from the battery compartment using suitable lifting devices.

 **N.B.:** dead batteries are classified as dangerous waste and as such must be delivered to an authorized body for disposal.

INSERTING THE BATTERIES IN THE MACHINE (BATTERY VERSIONS)

The batteries must be housed in the specific compartment beneath the rear body, and handled using lifting equipment suitable in terms of both weight and coupling system.

 **DANGER:** make sure that you comply with the accident prevention regulations in force in the country where you work or with DIN EN 50272-3 and DIN EN 50110-1, before any handling of the batteries.

 **WARNING:** to prevent an accidental short circuit use insulated tools to connect the batteries, and do not place or drop metal objects on the battery. Remove rings, watches and any clothing with metal parts that may come into contact with the battery terminals.

The various phases for inserting the batteries in the battery compartment are as follows:

1. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
2. Go to the back of the machine and open the tailgate by pressing the lever (1) (**Fig.1**).
3. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (4) in the hole (5) on the tailgate (**Fig.5**).
4. Remove the two side panels (2) (**Fig.2**).
5. Remove the battery case retainer blades (3) (**Fig.3**).

 **N.B.:** The necessary equipment is not supplied with the machine.

 **WARNING:** the following operations must be carried out by qualified personnel.

 **N.B.:** for battery maintenance and daily recharging, respect the indications provided by the manufacturer or retailer.

 **WARNING:** all installation and maintenance operations must be carried out by specialized personnel.

 **N.B.:** before installing the battery, clean the battery compartment. Check that the connectors on the cables supplied are functioning correctly.

 **ATTENTION:** check that the characteristics of the battery that you are looking to use are appropriate for the type of work to be performed. Check the battery charge and the condition of the contacts on the battery.

 **N.B.:** you are advised to only lift and move the batteries with lifting and transportation means suitable for the specific weight and size

 **WARNING:** the lifting hooks must not damage the blocks, connectors or cables.

 **N.B.:** Before inserting the batteries, remember to cover the terminals with a little grease to protect them against external corrosion.

6. House the two battery cases in the specific compartment, positioning the poles "+" and "-" opposite each other (**Fig.4**).
7. Fix the two battery cases in place with the retainer blades (3) that you removed earlier.
8. Refit the side panels (2) that you removed earlier.

 **N.B.:** The necessary equipment is not supplied with the machine.

CONNECTING THE BATTERIES (BATTERY VERSIONS)

The batteries should be connected so as to obtain a total voltage of 36V.



ATTENTION: you are advised to have the electric connections made by a qualified, COMAC-trained technician.



WARNING: to prevent an accidental short circuit use insulated tools to connect the batteries, and do not place or drop metal objects on the battery. Remove rings, watches and any clothing with metal parts that may come into contact with the battery terminals.

The procedure for connecting the batteries to the machine's electrical system is as follows:

1. Using the supplied jumper cable, connect the batteries to the "+" and "-" poles in series.
2. Connect the battery connector cable to the "+" and "-" poles in order to obtain the terminal voltage of 36V.
3. Connect the electrical system connector to the battery connector.

RECHARGING THE BATTERIES (BATTERY VERSIONS)

The batteries must be charged prior to first use, and whenever they no longer provide sufficient power.



N.B.: Carefully read the Use and Maintenance Manual for the batteries you wish to use before charging.

1. Bring the machine to the area where the batteries are charged.
2. Carry out the steps necessary to secure the machine (read "MACHINE SAFETY" on page 18).



ATTENTION: park the machine in an enclosed place, on a flat and level surface; near the machine there must be no objects that could either damage it, or be damaged through contact with it.



ATTENTION: the room used to recharge the batteries must be adequately ventilated to prevent the accumulation of gases that leak from batteries.

3. Get off the machine.
4. Go to the back of the machine and open the tailgate by pressing the lever (1) (**Fig.1**).
5. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (4) in the hole (5) on the tailgate (**Fig.5**).



WARNING: the following operations must be carried out by qualified personnel. An incorrect connection of the connector may cause a malfunction of the device.

6. Disconnect the battery connector from the machine's general system connector.
7. Connect the external battery charger cable to the battery connector.



N.B.: the coupling connector of the battery charger is consigned inside the bag containing this instruction booklet, and must be assembled on the cables of the battery charger as indicated in the instructions.



ATTENTION: Before connecting the batteries to the battery charger, make sure it is suitable for the batteries you want to use.



N.B.: carefully read the use and maintenance instructions of the battery charger that is used for charging.



CAUTION: keep the tailgate open throughout the battery recharging cycle to allow gas fumes to escape.

8. Once the recharge cycle has been completed, disconnect the battery charger cable from the battery connector.
9. Connect the electrical system connector to the battery connector.
10. Rotate the tailgate back to its normal position, remembering to remove the rotation retainer pin (5) from the hole (4) before closing the tailgate (**Fig.5**).

TYPE OF BATTERY TO BE USED (VERSIONS WITH ENDOTHERMIC ENGINE)

The battery used must meet the requisites laid down in standards EN 50342-1 and EN 50342-2 relating to batteries used to start up internal combustion engines. **To ensure good performance, the machine starter battery must be a 12V 73Ah 600A battery.**

MAINTENANCE AND DISPOSAL OF THE BATTERY (VERSIONS WITH ENDOTHERMIC ENGINE)

Follow the battery manufacturer's instructions for battery maintenance and charging.

When the battery reaches the end of its working life, it must be disconnected by a COMAC assistance centre technician or by a specialised and properly trained worker, and removed from the battery compartment using suitable lifting devices.



N.B.: the dead battery is classified as dangerous waste so it is compulsory to hand it over to an authorised disposal centre.

INSERTING THE BATTERY IN THE MACHINE (VERSIONS WITH ENDOTHERMIC ENGINE)

For transportation purposes, the starter battery may have to be inserted in the relative compartment underneath the rear body. To position the battery in the machine, proceed as follows:

 **DANGER:** make sure that you comply with the accident prevention regulations in force in the country where you work or with DIN EN 50272-3 and DIN EN 50110-1, before any handling of the batteries.

 **WARNING:** to prevent an accidental short circuit use insulated tools to connect the batteries, and do not place or drop metal objects on the battery. Remove rings, watches and any clothing with metal parts that may come into contact with the battery terminals.

1. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
2. Go to the back of the machine and open the tailgate by pressing the lever (1) (**Fig.1**).
3. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (4) in the hole (5) on the tailgate (**Fig.5**).
4. Remove the right-hand side panel (6) (**Fig.6**).
5. Remove the battery retainer blade (8).

 **N.B.:** The necessary equipment is not supplied with the machine.

 **WARNING:** the following operations must be carried out by qualified personnel.

 **N.B.:** For battery maintenance and charging, follow the manufacturer's or retailer's instructions scrupulously.

 **WARNING:** all installation and maintenance operations must be carried out by specialized personnel.

 **N.B.:** before installing the battery, clean the battery compartment. Check that the connectors on the cables supplied are functioning correctly.

 **ATTENTION:** check that the characteristics of the battery that you are looking to use are appropriate for the type of work to be performed. Check the battery charge and the condition of the contacts on the battery.

 **N.B.:** you are advised to only lift and move the batteries with lifting and transportation means suitable for the specific weight and size

 **WARNING:** the lifting hooks must not damage the blocks, connectors or cables.

 **N.B.:** Before inserting the batteries, remember to cover the terminals with a little grease to protect them against external corrosion.

6. House the battery in its compartment, positioning the "+" and "-" poles so they are facing out of the machine.
7. Fix the battery in place with the retainer blade (8) that you removed earlier (**Fig.7**).
8. Refit the side panel that you removed earlier.

 **N.B.:** The necessary equipment is not supplied with the machine.

CONNECTING THE BATTERY (VERSIONS WITH ENDOTHERMIC ENGINE)

 **ATTENTION:** you are advised to have the electric connections made by a qualified, COMAC-trained technician.

 **WARNING:** to prevent an accidental short circuit use insulated tools to connect the batteries, and do not place or drop metal objects on the battery. Remove rings, watches and any clothing with metal parts that may come into contact with the battery terminals.

The procedure for connecting the batteries to the machine's electrical system is as follows:

1. Connect the "+" cable to the "+" pole of the battery.
2. Connect the "-" cable to the "-" pole of the battery.
3. Position the battery cable terminal cover.

 **N.B.:** The necessary equipment is not supplied with the machine.

MAINTENANCE AND DISPOSAL OF THE ENDOTHERMIC ENGINE

For the maintenance and disposal of the endothermic engine, respect the instructions provided by the engine manufacturer. When the endothermic engine reaches the end of its working life, it must be disconnected by a COMAC assistance centre technician or by a specialised and properly trained worker, and removed from the compartment underneath the rear body using suitable lifting devices.



N.B.: the endothermic engine is classified as dangerous waste so it is compulsory to hand it over to an authorised disposal centre.

MAINTENANCE AND DISPOSAL OF THE LPG CYLINDER

For the maintenance and disposal of the LPG cylinder, respect the instructions provided by the cylinder manufacturer. When the cylinder reaches the end of its working life, it must be disconnected by a COMAC assistance centre technician or by a specialised and properly trained worker, and removed from the compartment underneath the rear body using suitable lifting devices.



N.B.: the LPG cylinder is classified as dangerous waste so it is compulsory to hand it over to an authorised disposal centre.

TYPE OF FUEL TO BE USED

To obtain the right power and performance from the endothermic engine, use fuel of suitable quality (for the specifications of the recommended fuel, refer to the "CHARACTERISTICS OF THE FUEL" paragraph in the use and maintenance manual of the engine itself). The engine use and maintenance manual is consigned together with the machine.

REFUELLING



DANGER: the fuel is highly flammable and explosive. Shut off the engine and allow it to cool before refuelling.



DANGER: The refuelling place must be well aired. Never refuel the engine inside a building where the gasoline fumes could come into contact with flames or sparks.



DANGER: the fuel is highly flammable and explosive. Keep away from fires and do not shake fuel containers. Don't smoke in the refuelling area! Discharge any static electricity from your body before approaching the fuel tank.



WARNING: It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out. Always put on protective gloves before handling the fuel, to avoid the risk of serious injury to hands. Fuels may contain substances similar to solvents. Avoid any contact of mineral oil products with the skin and eyes. Use gloves when refuelling. Change your protective clothes frequently, and clean them.



WARNING: Always open the tank cap carefully, to slowly discharge the overpressure and prevent fuel from spurting out.



WARNING: Don't inhale the fuel vapours.



WARNING: For environmental protection purposes, make sure the fuel doesn't seep into the ground.



WARNING: In the event of a fuel spill, clean the machine immediately.



WARNING: After refuelling, replace the tank cap. Tighten it firmly, but without using tools. The cap must not come loose while the machine is being used.



WARNING: Check the tank for any leaks or ineffective seals. If you notice a fuel leakage, do not switch on or use the machine.



WARNING: Keep the fuel in containers that meet the legal requisites and bear an identification label.



WARNING: The endothermic engine must only be powered using the fuel type described in the use and maintenance manual for the engine itself, which can be found attached to the following booklet.

In order to perform the refuelling operations, do the following:

1. Bring the machine to the refuelling area.
2. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
3. Go to the back of the machine and open the tailgate by pressing the lever (1) (**Fig.1**).
4. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (4) in the hole (5) on the tailgate (**Fig.5**).
5. Remove the fuel tank cap (9) (**Fig.8**).
6. Fill the tank with the appropriate fuel.



WARNING: Do not overfill the fuel tank. If too much fuel is added, it could spill out while the vehicle is being driven. The fuel could also spill out due to an increase in volume caused by high ambient temperatures.

 **WARNING:** Remember to carefully check the endothermic engine's use and maintenance manual in order to make sure that the correct type of fuel is being used for the refuelling operations. The use of an incorrect type of fuel for the refuelling operations could cause serious damage to the engine and the fuel delivery system.

 **WARNING:** If the refuelling operations are carried out using an incorrect fuel type, the intervention of a qualified technician must be requested before starting the engine. In fact, the engine and the fuel delivery system could be seriously damaged if the engine is started.

7. When the tank is full, replace the fuel tank cap (9).

LPG CYLINDER INSERTION

 **DANGER:** The LPG cylinder mustn't be replaced in the presence of open flames, cinders, or active electrical devices.

 **DANGER:** Before replacing the cylinder, make sure its tap and the tap on the full cylinder are closed. If they aren't, tighten them by rotating the knob in the direction shown by the pictogram on them.

 **DANGER:** The LPG cylinders must always be purchased from authorised retailers. It is strictly forbidden by law to have the cylinders filled by automobile LPG distributors or using amateur means, as this can be extremely dangerous. The cylinders may only be filled by authorized facilities. Unauthorized filling is subject to criminal penalties and a pecuniary fine. The penalty is applied directly to the user.

 **WARNING:** The endothermic engine must only be powered using the LPG described in the use and maintenance manual for the engine itself, which can be found attached to the following booklet.

 **WARNING:** It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out.

In order to insert the cylinder into the machine, do the following:

1. Bring the machine to the refuelling area.
2. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
3. Go to the back of the machine and open the tailgate by pressing the lever (1) (**Fig.1**).
4. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (4) in the hole (5) on the tailgate (**Fig.5**).
5. Position the cylinder above the support, making sure the tap is facing the front of the machine.

 **ATTENTION:** The cylinder must only be lifted and handled using means of lifting and transport that are suitable for its mass and size.

6. Fix the cylinder to its support by means of the retainer blades (10) (**Fig.9**).
7. Connect the LPG delivery tube to the valve in the cylinder.

 **N.B.:** The necessary equipment is not supplied with the machine.

 **ATTENTION:** Remember to insert the gasket between the LPG delivery hose and the valve on the cylinder.

 **ATTENTION:** Before attempting to turn on the machine after replacing the cylinder, always perform a seal test on the connections using soapy water (never use flames for this purpose).

 **ATTENTION:** Use only 15 kg LPG cylinders measuring 315x655 mm ($\varnothing_{max}$ x height).

SIDE BRUSH ASSEMBLY

To position the side brush, which for reasons of packaging is supplied dismantled from the machine, proceed as follows:

1. Make sure the machine is switched on. If it isn't, read "SWITCHING ON THE MACHINE" on page 30.
2. Engage the parking brake and press the pedal (11) fully down, turning the lever (12) anti-clockwise (**Fig.10**). The lever is located next to the operator's seat.

 **N.B.:** As soon as the parking brake is engaged, the relative red warning light (13) will be illuminated on the instrument panel (**Fig.11**).

3. Check the side brush command arm is in the idle position (it must be inside the machine). If it isn't, pull the lever (14) upwards (**Fig.12**).

 **N.B.:** if the machine is fitted with a left-hand side brush, activate the two-way switch (15) on the instrument panel before shifting the lever (14) (**Fig.13**).

 **N.B.:** the two-way switch is active when the LED inside it is illuminated.

4. Make sure the debris hopper hatch is closed. If it isn't, pull the lever (16) upwards (**Fig.14**).

 **N.B.:** As soon as the hatch is closed, the relative red warning light (17) will be illuminated on the instrument panel (**Fig.15**).

5. Raise the debris hopper to its dumping position, pulling the lever (18) upwards (**Fig.16**).

6. Get off the machine and insert the safety retainers (19) in the rods of the debris hopper command pistons (**Fig.17**).

7. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.

8. Using suitable tools, remove the screws (20) from the brush-holder hub (**Fig.18**).

9. Insert the side brush (21) in the brush-holder hub (**Fig.19**).

10. Use the screws you removed earlier to attach the side brush to the hub.

11. Remove the safety retainers (19) from the rods of the debris hopper command pistons (**Fig.20**).

12. Run the machine switch-on procedure (see "SWITCHING ON THE MACHINE" on page 30).

13. Lower the debris hopper by pushing the lever (18) downwards (**Fig.21**).

 **N.B.:** apart from shifting the lever (18), the debris hopper will only move down if the "operator present" button (22) on the instrument panel is also pressed (**Fig.22**).

 **N.B.:** The necessary equipment is not supplied with the machine.

ADJUSTMENT OF DRIVING POSITION

The careful adjustment of the driver's seat ensures a greater sense of comfort when using the machine; the seat should always be positioned using the pedals as a point of reference, in order to adjust the seat, use the lever located under the seat.

 **N.B.:** The distance should be adjusted so that with the pedals fully pressed to the floor the knees are slightly bent (about 120°).

 **N.B.:** Adjust the distance of the seat so that when pressing the brake pedal it goes as far as it can. This operation should be done with the machine running so as to pressurise the braking system.

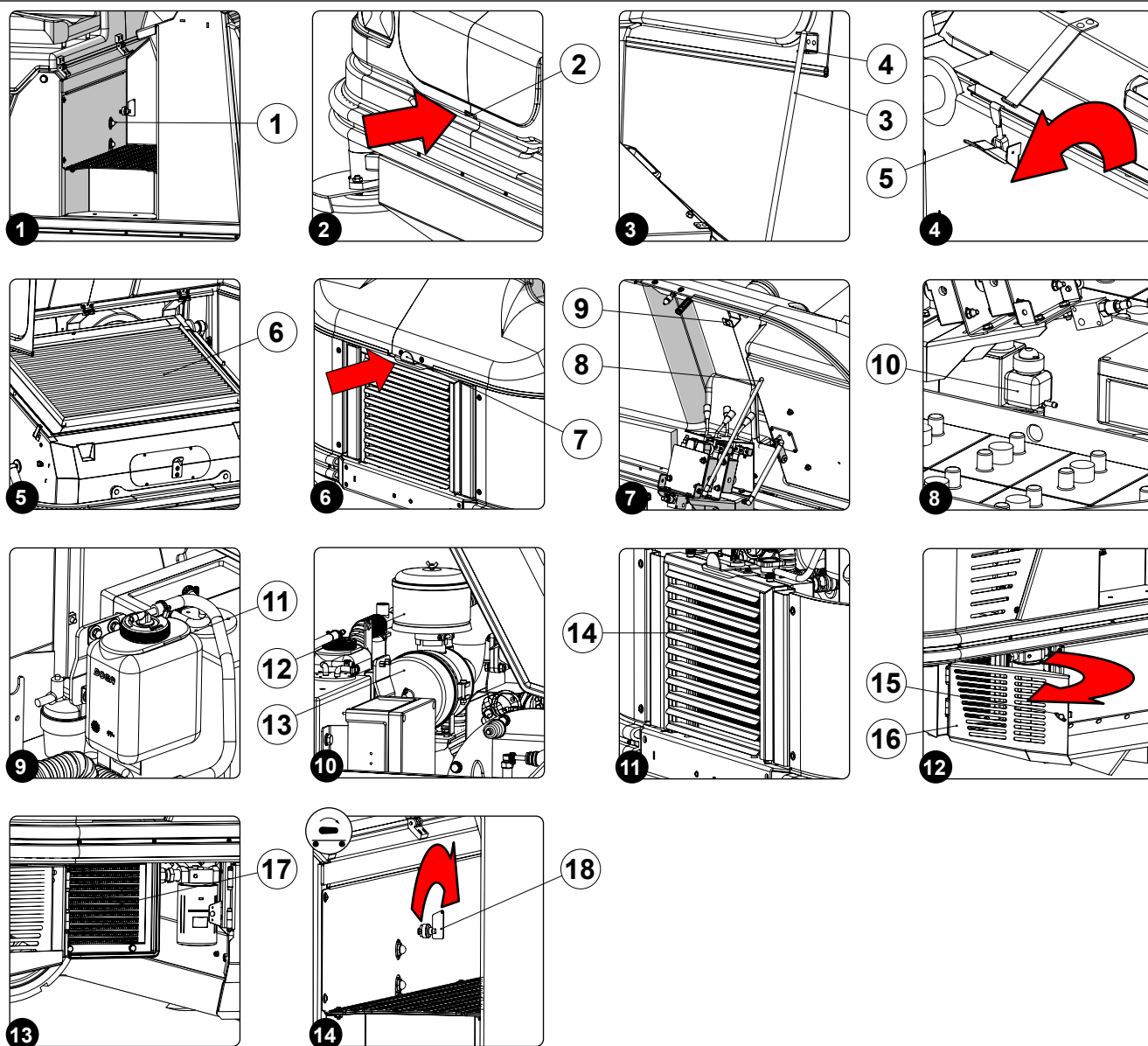
 **N.B.:** If the knee is not bent enough, it is too far from the steering wheel, if however the knee is bent almost 90° then it is too close to the steering wheel.

 **N.B.:** The feet should be positioned keeping the heels on the footboard; the part of the foot directly below the toes should push the pedals.

 **N.B.:** The ideal driving position is that which allows you to grip the steering wheel correctly with the palms slightly lower than the shoulders. With a good grip on the steering wheel, the elbows should be bent by about 120°. They should be at least 30 cm or 11.81 in between the middle of the steering wheel and our breastbone. In any case, this distance should be no more than 45 cm or 17.72 in. To adjust the tilt of the steering wheel, use the lever next to the steering column.

 **N.B.:** the ideal position for the headrest is when its upper edge is at the same height as the operator's head or preferably even slightly above.

PREPARING TO WORK



Before beginning to work, make the following checks:

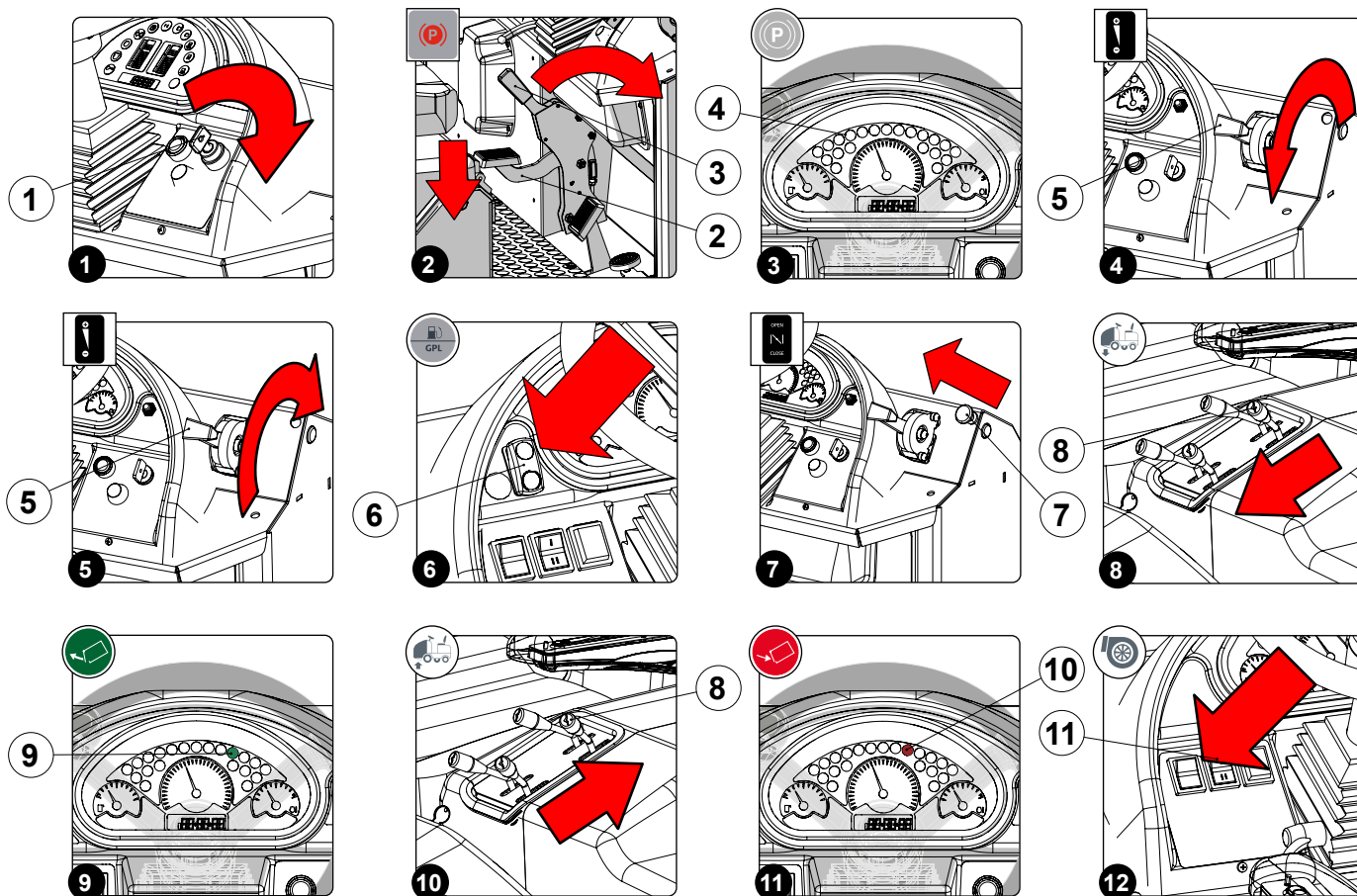
1. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
2. Make sure the debris hopper is empty. If it isn't, empty it (see "EMPTYING THE DEBRIS HOPPER" on page 42).
3. For battery-powered machines, make sure the battery charge level is suitable for the task to be carried out. If it isn't, recharge the batteries (see "RECHARGING THE BATTERIES (BATTERY VERSIONS)" on page 22).
4. For combustion engine machines, make sure the fuel level is suitable for the task to be carried out. If it isn't, top it up (see "REFUELLING" on page 24).
5. Check the state of wear of the side brush, replacing it if necessary (see "SIDE BRUSH REPLACEMENT" on page 49).
6. Make sure the hydraulic system oil level is good. The oil level can be seen via the bulb (1) near the operator's seat (**Fig.1**). If the level is lower than the MIN mark, top it up (see "TOPPING UP THE HYDRAULIC SYSTEM OIL" on page 50).
7. Go to the front of the machine and open the hood by pressing the lever (2) (**Fig.2**).
8. Rotate the hood to the maintenance position, remembering to insert the rotation retainer pin (3) in the hole (4) on the hood (**Fig.3**).
9. Release the retainers (5) and remove the vacuum cover (**Fig.4**).
10. Check the vacuum filter (6) is clean (**Fig.5**). If it isn't, clean it (see "CLEANING THE VACUUM FILTER" on page 45).
11. Reposition the vacuum cover and attach it to the debris hopper by means of the retainers (5).
12. Close the hood.
13. Go to the back of the machine and open the tailgate by pressing the lever (7) (**Fig.6**).
14. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (8) in the hole (9) on the tailgate (**Fig.7**).
15. Make sure the brake system oil level is good. The oil level must be between the MAX and MIN references in the basin (10) (**Fig.8**). If it's lower than the MIN level, top it up (see "TOPPING UP THE BRAKE SYSTEM OIL" on page 50).
16. For versions with an endothermic engine, make sure the coolant level is good. The coolant level must be between the MAX and MIN references in the basin (11) (**Fig.9**). If it's lower than the MIN level, top it up (see "TOPPING UP THE ENDOTHERMIC ENGINE COOLANT" on page 50).

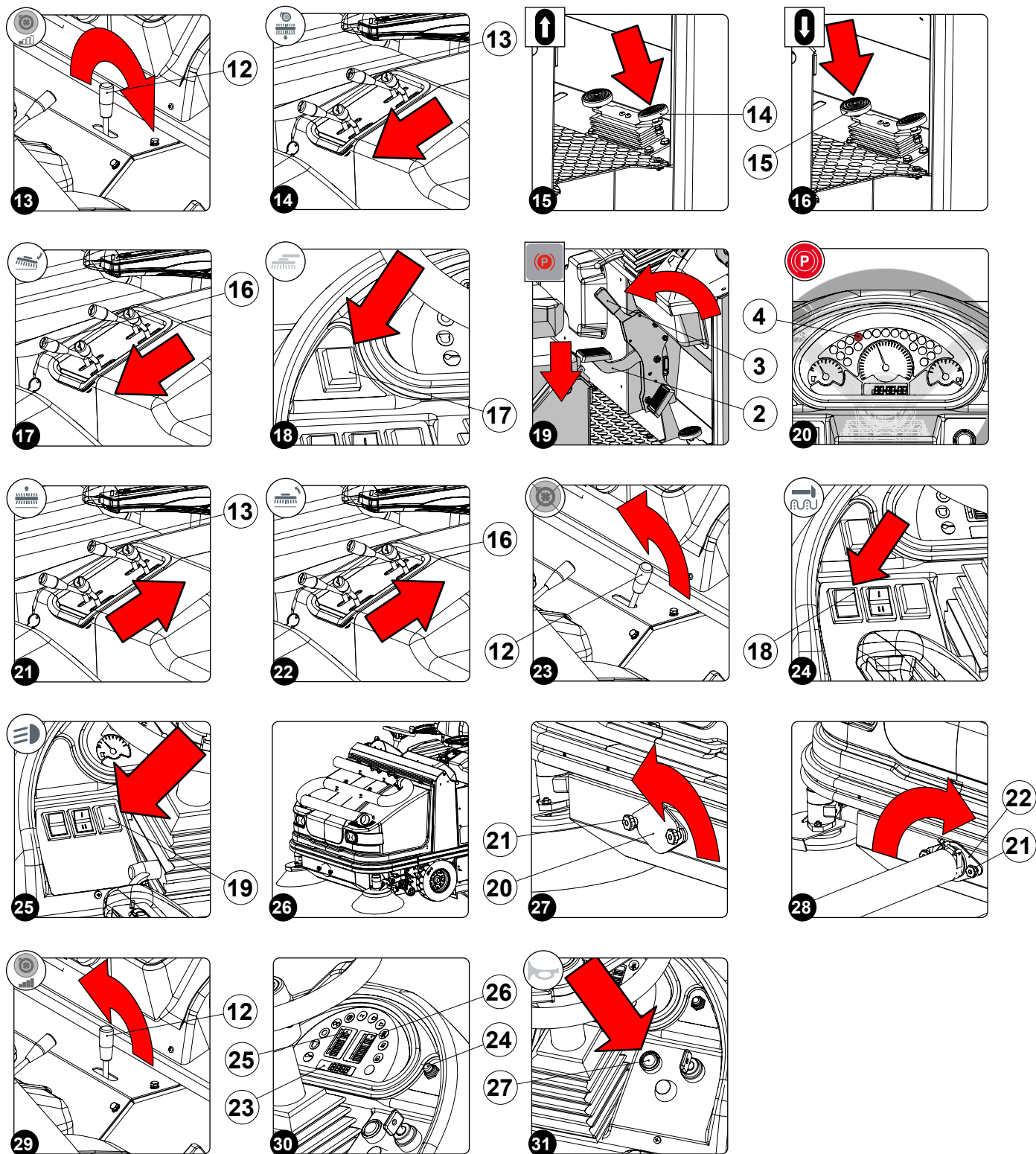
17. For versions with an endothermic engine, check the cyclone pre-filter (12) is clean (**Fig.10**). If it isn't, clean it (see "CLEANING THE AIR CYCLONE PRE-FILTER ON THE ENDOTHERMIC ENGINE INLET" on page 44).
18. For versions with an endothermic engine, check the air filter (13) is clean (**Fig.10**). If it isn't, clean it (see "CLEANING THE AIR FILTERING CARTRIDGES ON THE ENDOTHERMIC ENGINE INLET" on page 44).
19. For versions with an endothermic engine, check the engine radiator (14) is clean (**Fig.11**). If it isn't, clean it (see "CLEANING THE ENDOTHERMIC ENGINE COOLING SYSTEM RADIATOR" on page 45).
20. Make a thorough inspection of the compartment underneath the tailgate, checking there are no: oil leaks from the hydraulic system; oil leaks from the brake system; fuel leaks; coolant leaks; leaks from the LPG system. If there are any leaks, contact a COMAC assistance centre straight away and explain the problem.
21. For versions with an endothermic engine, read the BEFORE STARTING UP THE ENGINE paragraph in the use and maintenance manual of the engine itself (consigned together with the machine).
22. Close the tailgate.
23. Go to the rear right-hand part of the machine and open the rear RH panel (15) by rotating the retainer (16) (**Fig.12**).
24. Make sure the hydraulic system radiator (17) is clean (**Fig.13**). If it isn't, clean it (see "CLEANING THE HYDRAULIC SYSTEM OIL RADIATOR" on page 43).
25. Close the rear RH panel.
26. Go to the back of the machine and open the tailgate by pressing the lever (7) (**Fig.6**).
27. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (8) in the hole (9) on the tailgate (**Fig.7**).

⚠ WARNING: the following operations must be carried out by qualified personnel. An incorrect connection of the connector may cause a malfunction of the device.

28. For battery-powered versions, connect the battery connector to the electrical system connector.
29. For versions with an endothermic engine, check the starter battery is properly connected to the machine's electrical system.
30. Close the tailgate.
31. For versions with a combustion engine, make a quarter turn clockwise with the battery cut-out lever (18) (**Fig.14**).

WORK





SWITCHING ON THE MACHINE

The procedure for switching on the battery-powered machine is as follows:

1. Carry out all the checks listed in the chapter "PREPARING TO WORK" on page 27.
2. Sit on the driver's seat.

 **N.B.:** the machine has a dead man's microswitch underneath the operator's seat, which prevents the machine from moving if the driver is not properly seated.

3. Insert the key (1) into the main switch on the control panel and move the main switch to position "I" by turning the key a quarter turn clockwise (**Fig.1**).

 **ATTENTION:** when the machine is switched on, the instrument panel runs a test during which both digital displays and all the indicator lights are activated, along with the horn.

 **N.B.:** at the end of the test, the hour meter shows the partial work hours and the two digital displays show the relative measurement unit. Only those indicator lights effectively active will remain ON.

4. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.2**). The lever is located next to the operator's seat.

 **N.B.:** As soon as the parking brake is disengaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.3**).

The procedure for switching on the machine with a diesel-powered endothermic engine is as follows:

1. Carry out all the checks listed in the chapter "PREPARING TO WORK" on page 27.
2. Sit on the driver's seat.

 **N.B.:** the machine has a dead man's microswitch underneath the operator's seat, which prevents the machine from moving if the driver is not properly seated.

3. Insert the key (1) in the main switch on the control panel (**Fig.1**).
4. Check the accelerator command lever (5) is set at minimum. If it isn't, shift it in the direction of the arrow (**Fig.4**).
5. Carry out all the procedures explained in the ENGINE START-UP paragraph in the use and maintenance manual of the engine (consigned together with the machine).

 **ATTENTION:** when the machine is switched on, the instrument panel runs a test during which all the digital displays and indicator lights are brought to zero and the horn is activated.

 **N.B.:** at the end of the test, the hour meter shows the partial work hours and the analogue displays show the relative measurement unit. Only those indicator lights effectively active will remain ON.

 **N.B.:** to ensure correct machine operation, let the endothermic engine run for a few seconds and then move the lever (5) to the end of its stroke (**Fig.5**); this will set the accelerator at its maximum position.

6. Carry out all the procedures explained in the AFTER ENGINE START-UP paragraph in the use and maintenance manual of the engine (consigned together with the machine).
7. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.2**). The lever is located next to the operator's seat.

 **N.B.:** As soon as the parking brake is disengaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.3**).

The procedure for switching on the machine with an LPG-powered endothermic engine is as follows:

1. Carry out all the checks listed in the chapter "PREPARING TO WORK" on page 27.
2. Sit on the driver's seat.

 **N.B.:** the machine has a dead man's microswitch underneath the operator's seat, which prevents the machine from moving if the driver is not properly seated.

3. Insert the key (1) in the main switch on the control panel (**Fig.1**).
4. Check the accelerator command lever (5) is set at minimum. If it isn't, shift it in the direction of the arrow (**Fig.4**).
5. Carry out all the procedures explained in the ENGINE START-UP paragraph in the use and maintenance manual of the engine (consigned together with the machine).

 **ATTENTION:** when the machine is switched on, the instrument panel runs a test during which all the digital displays and indicator lights are brought to zero and the horn is activated.

 **N.B.:** at the end of the test, the hour meter shows the partial work hours and the analogue displays show the relative measurement unit. Only those indicator lights effectively active will remain ON.

-  **N.B.:** to select the type of fuel for powering the endothermic engine, use the switch (6) on the instrument panel (**Fig.6**).
 -  **N.B.:** pull the knob (7) (**Fig.7**) up to CLOSE the air lever. Push the knob (7) down to OPEN the air lever.
 -  **N.B.:** to ensure correct machine operation, let the endothermic engine run for a few seconds and then move the lever (5) to the end of its stroke (**Fig.5**); this will set the accelerator at its maximum position.
6. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.2**). The lever is located next to the operator's seat.
-  **N.B.:** As soon as the parking brake is disengaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.3**).

STARTING WORK

To start working, proceed as follows:

1. Sit on the driver's seat.
 2. Switch on the machine (see "SWITCHING ON THE MACHINE" on page 30).
 3. Open the debris hopper hatch by pushing the lever (8) on the instrument panel down (**Fig.8**).
-  **N.B.:** as soon as the debris hopper hatch is open, the green indicator light (9) will light up on the instrument panel to indicate that the hatch is in the work position (**Fig.9**).
 -  **ATTENTION:** if there is bulky debris in the path of the machine, close the hatch temporarily to allow better access and collection. To do this, pull the lever (8) on the instrument panel up (**Fig.10**).
 -  **N.B.:** as soon as the debris hopper hatch is closed, the red warning light (10) will light up on the instrument panel to indicate that the hatch is in the idle position (**Fig.11**).
4. Make sure the vacuum turbine command two-way switch (11) is activated. If it isn't, activate it (**Fig.12**).
-  **ATTENTION:** for machines with a front vacuum kit, check the turbine speed adjustment lever (12) is in the LOW position (**Fig.13**). If it isn't, move it to the right. The lever is located next to the operator's seat.
 -  **ATTENTION:** if the machine needs to move on a damp surface or through stagnant water while working, deactivate the vacuum turbine beforehand.
 -  **N.B.:** the two-way switch is active when the LED inside it is illuminated.
5. Bring the central brush to its work position by pushing the lever (13) down (**Fig.14**).
-  **N.B.:** only when the central brush is in the work position will its motor begin working, and also the turbine.
Press the drive pedal (14) to begin moving the machine (**Fig.15**).
 -  **N.B.:** to reverse the machine, press the reverse pedal (15) (**Fig.16**).
 -  **ATTENTION:** the machine moves more slowly in reverse than with forward movements.
 -  **ATTENTION:** an acoustic signal will sound as soon as reverse is activated, and for as long as it remains active.
If required by the dirt situation, lower the RH side brush (1SL versions) by pushing the side brush command lever (16) forward (**Fig.17**).
 -  **N.B.:** only when the side brush is in the work position will its motor begin working.
 -  **N.B.:** to bring the LH side brush to its work position (2SL versions), activate the LH side brush two-way switch (17) on the instrument panel (**Fig.18**).
 -  **N.B.:** the two-way switch is active when the LED inside it is illuminated.
 -  **N.B.:** Use the side brush in a limited manner on the edges, as it is not assisted by the vacuum.

To ensure a correct vacuum action, clean the filter approximately every 10 minutes and always clean it before emptying the debris hopper. To do this, proceed as follows:

- Stop the machine.
- Engage the parking brake and press the pedal (2) fully down, turning the lever (3) anti-clockwise (**Fig.19**). The lever is located next to the operator's seat.

 **N.B.:** as soon as the parking brake is engaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.20**).

- Bring the central brush to its idle position by pulling the lever (13) up (**Fig.21**).

 **N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.

- Bring the RH side brush to its idle position by pulling the lever (16) up (**Fig.22**).

 **N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.

 **N.B.:** to bring the LH side brush to its idle position (2SL versions), deactivate the LH side brush two-way switch (17) on the instrument panel (**Fig.18**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

6. Deactivate the vacuum turbine command two-way switch (11) (**Fig.12**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

 **ATTENTION:** for machines with a front vacuum kit, bring the turbine speed adjustment lever (12) to the central position (**Fig.23**). The lever is located next to the operator's seat.

- Activate the filter shaker by pressing the button (18) on the instrument panel (**Fig.24**).

 **ATTENTION:** Do not keep the switch (18) pressed longer than ten seconds; repeat this operation two or three times.

 **N.B.:** check the debris hopper regularly to see whether it's full, and empty it if necessary (see "EMPTYING THE DEBRIS HOPPER" on page 42).

 **ATTENTION:** Keep in mind that the weight of the waste collected is proportional to the specific weight of the material swept. In the case of heavy material such as sand, earth, gravel, etc., the debris hopper should ideally not be filled to more than 70%, otherwise it may be difficult to empty.

If the headlights need to be activated while using the machine, do this via the switch (19) on the instrument panel (**Fig.25**).

 **N.B.:** the two-way switch is active when the LED inside it is illuminated.

FRONT VACUUM KIT

Upon request, the machine can be fitted with a front vacuum kit. To use this kit, proceed as follows:

1. Stop the machine.
2. Engage the parking brake and press the pedal (2) fully down, turning the lever (3) anti-clockwise (**Fig.19**). The lever is located next to the operator's seat.

 **N.B.:** as soon as the parking brake is engaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.20**).

3. Bring the central brush to its idle position by pulling the lever (13) up (**Fig.21**).

 **N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.

4. Bring the RH side brush to its idle position by pulling the lever (16) up (**Fig.22**).

 **N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.

 **N.B.:** to bring the LH side brush to its idle position (2SL versions), deactivate the LH side brush two-way switch (17) on the instrument panel (**Fig.18**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

5. Close the debris hopper hatch by pulling the lever (8) on the instrument panel up (**Fig.10**).

 **N.B.:** as soon as the debris hopper hatch is closed, the red warning light (10) will light up on the instrument panel to indicate that the hatch is in the idle position (**Fig.11**).

6. Deactivate the vacuum turbine by bringing the lever (12) to the central position (**Fig.23**). The lever is located next to the operator's seat.

7. Go to the front of the machine and take the vacuum tube out of the supports in the hood (**Fig.26**).

8. Remove the blade (20) in the front part of the debris hopper, remembering to loosen the knobs (21) beforehand (**Fig.27**).

9. Fix the vacuum tube support blade (22) to the debris hopper by retightening the knobs (**Fig.28**).

10. Activate the vacuum turbine at maximum speed by bringing the lever (12) to the left-hand position (**Fig.29**). The lever is located next to the operator's seat.

 **WARNING:** it is categorically forbidden to use this device to vacuum/collect flammable and/or explosive dusts and/or liquids, or incandescent particles. These include gasoline, paint thinners and fuel oil (which, when mixed with the vacuum air, can form explosive vapours or mixtures), and also non-diluted acids and solvents, acetones, aluminium and magnesium powders. These substances may also corrode the materials used to construct the machine.

 **CAUTION:** if the machine is used in dangerous areas (e.g. petrol stations), the relative safety standards must be observed. It is forbidden to use the machine in environments with a potentially explosive atmosphere.

11. When the work is finished, remove the kit and place it in the storage compartment in the hood.

HOURLY METER

The instrument panel has an hour meter (23) (**Fig.30**) indicating the total effective work time. Press the button (24) to see the partial work time.

 **N.B.:** the pair of numbers before the “.” symbol identifies the work hours; the pair of numbers after the “.” symbol identifies the work minutes; the pair of numbers after the “.” symbol identifies the tenths of a minute.

 **N.B.:** when the hour meter is working, the “” symbol blinks.

BATTERY CHARGE LEVEL INDICATOR (BATTERY-POWERED VERSIONS)

The instrument panel (**Fig.30**) has a graphic symbol (25) showing the battery charge level. The indicator is divided into three coloured sectors:

Green: Indicates that the batteries have an excellent charge level.

Yellow: Indicates that the batteries have a sufficient charge level.

Red: Indicates that the batteries have a critical charge level.

 **ATTENTION:** as soon as the battery charge level turns red, stop the machine and take it to the battery recharging area.

SELECTING THE OPERATING DIRECTION

The machine movement direction is selected by means of pedals. The forward pedal (14) (**Fig.15**) and the reverse one (15) (**Fig.16**) are located in the footboard near the operator's seat.

 **N.B.:** to move forward, press the pedal (14) (**Fig.15**).

 **N.B.:** to move backward, press the pedal (15) (**Fig.16**). When reverse movement is engaged, an acoustic signal will sound and the white rear lights will come on.

 **ATTENTION:** adjust the machine movement speed by applying more or less pressure on the pedals (14) and (15).

 **CAUTION:** the reverse speed is lower than the forward speed to comply with current health and safety standards.

 **CAUTION:** the speed should be adjusted within a range that allows the machine to be controlled and stopped within the field of visibility and in safe conditions in the event of unforeseen circumstances.

 **CAUTION:** Maintain a suitable speed: for your psycho-physical condition; in relation to the machine characteristics and condition; in relation to the machine load; in relation to the adherence of the wheels on the ground; in relation to the characteristics and conditions of the ground; in relation to the maintenance and cleanliness of the ground.

SERVICE BRAKE – PARKING BRAKE

The machine has a service brake pedal (2), to be used to stop the machine when required (**Fig.19**).

The machine has a parking brake lever (3), to be used to stop the machine when it is parked (**Fig.19**).

i **N.B.:** there is a symbol (4) on the command display that indicates whether the parking brake is engaged or not (**Fig.20**). When the symbol (4) is visible it means the parking brake is engaged.

WORKING HEADLIGHTS

The machine has headlights that are activated via the switch (19) on the instrument panel (**Fig.25**).

i **N.B.:** the two-way switch is active when the LED inside it is illuminated.

BUZZER

The machine is equipped with a buzzer. if you need to sound a warning, just press the button (27) on the control panel (**Fig.31**).

ALARM SCREEN

When an alarm is triggered, an indicator light will light up on the instrument panel and remain on until the error has been resolved.

When an alarm is activated, proceed as follows:

1. Stop the machine immediately.
2. Carry out the maintenance needed to eliminate the alarm.
3. If the error persists, contact your nearest COMAC service centre.

List of alarms:

	Symbol for critical current absorption level (battery-powered versions): The instrument panel (Fig.30) has a graphic symbol (26) showing the current absorption level of the machine when working. If the current absorption reaches a critical level during the work, stop the machine and take it to its parking area, then contact your nearest COMAC service centre.
	Insufficient fuel level symbol (versions with endothermic engine): If the "insufficient fuel level" indicator light is illuminated on the instrument panel while working, take the machine to the refuelling area and fill the fuel tank (see "REFUELLING" on page 24).
	Parking brake symbol: If the "parking brake engaged" indicator light is illuminated on the instrument panel while working, stop the machine and follow the procedure to release the parking brake.
	Alternator malfunction symbol (versions with endothermic engine): If the alternator malfunction indicator light is illuminated on the instrument panel while working, stop the machine and take it to its parking area, then contact your nearest COMAC service centre.
	Symbol for braking system pressure fault If the "low brake system oil level" indicator light is illuminated on the instrument panel while working, take the machine to the maintenance area and fill the brake system oil tank (see "TOPPING UP THE BRAKE SYSTEM OIL" on page 50).
	Symbol for critical hydraulic system oil temperature: If the "critical hydraulic system oil temperature" indicator light is illuminated on the instrument panel while working, stop the machine and take it to its parking area then wait for the temperature to drop. If the problem persists, contact your nearest COMAC service centre.
	Symbol for critical hydraulic system oil level: If the "low hydraulic system oil level" indicator light is illuminated on the instrument panel while working, take the machine to the maintenance area and fill the hydraulic system oil tank (see "TOPPING UP THE HYDRAULIC SYSTEM OIL" on page 50).
	Symbol for excessively high coolant temperature in the cooling system (versions with endothermic engine): If the "critical endothermic engine cooling system temperature" indicator light is illuminated on the instrument panel while working, stop the machine and take it to its parking area then wait for the temperature to drop. If the problem persists, contact your nearest COMAC service centre.
	Symbol for clogged hydraulic system filter: If the "clogged hydraulic system oil filter" indicator light is illuminated on the instrument panel while working, stop the machine and take it to its parking area, then contact your nearest COMAC service centre.

	Symbol for clogged air filter on endothermic engine inlet (versions with endothermic engine): If the "clogged endothermic engine inlet air filter" indicator light is illuminated on the instrument panel while working, stop the machine and take it to the maintenance area, then carry out all the procedures described in the ENGINE AIR FILTER paragraph in the MAINTENANCE chapter of the engine use and maintenance manual (consigned together with the machine). If the problem persists, contact your nearest COMAC service centre.
	Symbol for low endothermic engine oil pressure (versions with endothermic engine): If the "low endothermic engine oil pressure" indicator light is illuminated on the instrument panel while working, stop the machine and take it to the maintenance area, then carry out all the procedures described in the ENGINE OIL LEVEL paragraph in the MAINTENANCE chapter of the engine use and maintenance manual (consigned together with the machine). If the problem persists, contact your nearest COMAC service centre.

DEBRIS HOPPER OVERFLOW

The machine does not have an overflow device. When the debris hopper is full, proceed as follows:

1. Stop the machine.
2. Engage the parking brake and press the pedal (2) fully down, turning the lever (3) anti-clockwise (**Fig.19**). The lever is located next to the operator's seat.

 **N.B.:** as soon as the parking brake is engaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.20**).

3. Bring the central brush to its idle position by pulling the lever (13) up (**Fig.21**).

 **N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.

4. Bring the RH side brush to its idle position by pulling the lever (16) up (**Fig.22**).

 **N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.

 **N.B.:** to bring the LH side brush to its idle position (2SL versions), deactivate the LH side brush two-way switch (17) on the instrument panel (**Fig.18**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

5. Deactivate the vacuum turbine command two-way switch (11) (**Fig.12**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

 **ATTENTION:** for machines with a front vacuum kit, bring the turbine speed adjustment lever (12) to the central position (**Fig.23**). The lever is located next to the operator's seat.

6. Close the debris hopper hatch by pulling the lever (8) on the instrument panel up (**Fig.10**).

 **N.B.:** as soon as the debris hopper hatch is closed, the red warning light (10) will light up on the instrument panel to indicate that the hatch is in the idle position (**Fig.11**).

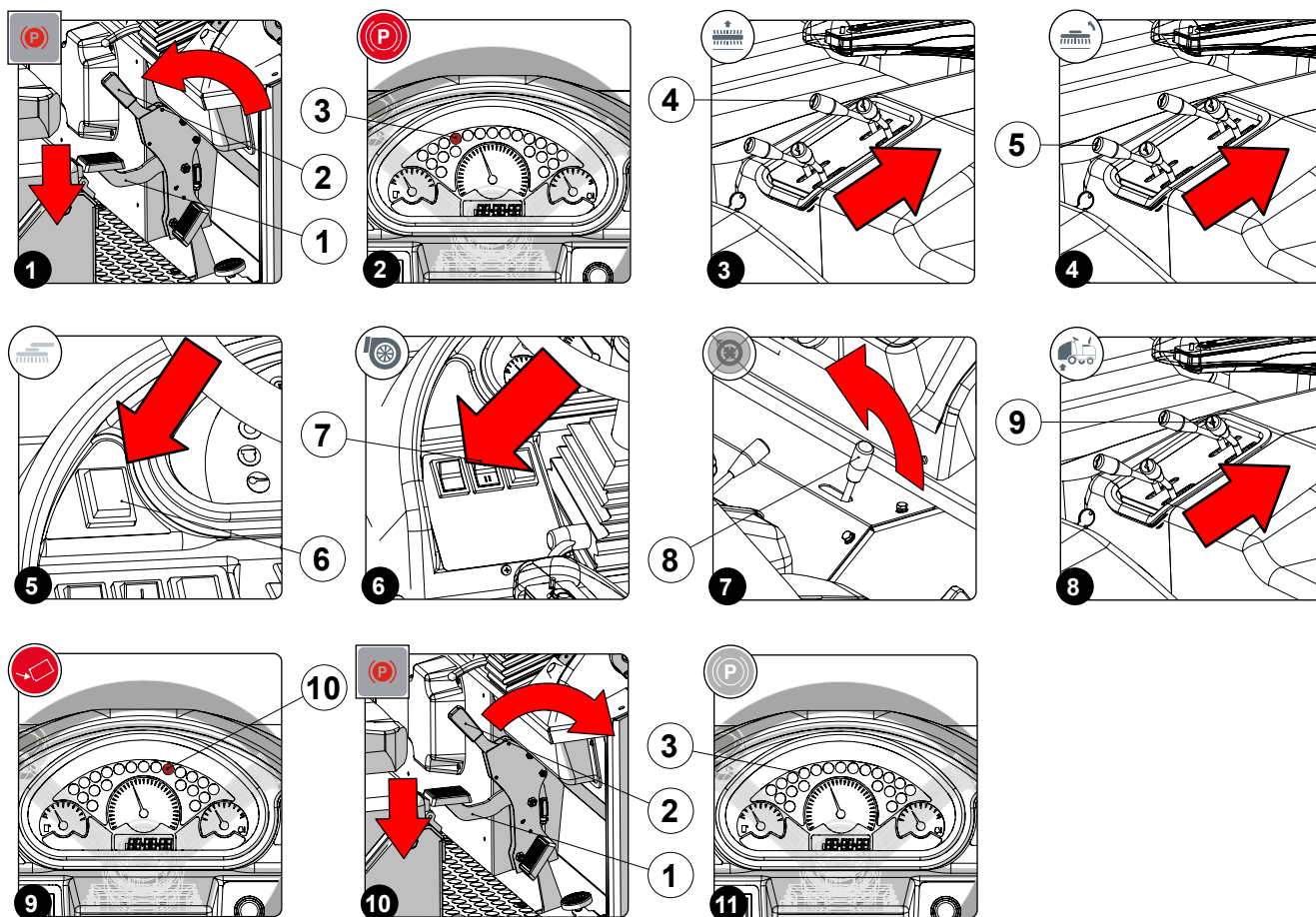
7. Release the parking brake and press the pedal (2), turning the lever (3) clockwise (**Fig.2**). The lever is located next to the operator's seat.

 **N.B.:** As soon as the parking brake is disengaged, the relative red warning light (4) will be illuminated on the instrument panel (**Fig.3**).

8. Take the machine to the debris dumping area and empty the hopper (see "EMPTYING THE DEBRIS HOPPER" on page 42).

 **N.B.:** the place designated for this operation must comply with current environmental protection regulations.

AT THE END OF THE WORK



At the end of the work, and before carrying out any type of maintenance, perform the following operations:

1. Stop the machine.
 2. Engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**). The lever is located next to the operator's seat.
- i N.B.:** as soon as the parking brake is engaged, the relative red warning light (3) will be illuminated on the instrument panel (**Fig.2**).
3. Make sure the central brush is in its idle position. If it isn't, pull the lever (4) up (**Fig.3**).
- i N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.
4. Make sure the RH side brush is in its idle position. If it isn't, pull the lever (5) up (**Fig.4**).
- i N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.
- i N.B.:** for versions with a twin side brush (2SL versions), make sure the LH side brush is in its idle position. If it isn't, deactivate the LH side brush two-way switch (6) on the instrument panel (**Fig.5**).
- i N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.
5. Make sure the vacuum turbine is deactivated. If it isn't, deactivate the vacuum turbine command two-way switch (7) (**Fig.6**).
- i N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.
- ⚠ ATTENTION:** for machines with a front vacuum kit, bring the turbine speed adjustment lever (8) to the central position (**Fig.7**). The lever is located next to the operator's seat.
6. Make sure the debris hopper hatch is closed. If it isn't, pull the lever (9) on the instrument panel upwards (**Fig.8**).
- i N.B.:** as soon as the debris hopper hatch is closed, the red warning light (10) will light up on the instrument panel to indicate that the hatch is in the idle position (**Fig.9**).

7. Release the parking brake, pressing the pedal (1) and turning the lever (2) clockwise (**Fig.10**). The lever is located next to the operator's seat.

 **N.B.:** as soon as the parking brake is disengaged, the relative red warning light (3) will be switched off on the instrument panel (**Fig.11**).

8. Take the machine to the debris dumping area and empty the hopper (see EMPTYING THE DEBRIS HOPPER).

 **WARNING:** the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

9. When the debris hopper is empty, take the machine to the maintenance area and carry out all the maintenance procedures listed in "ROUTINE MAINTENANCE" on page 38.

 **WARNING:** the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

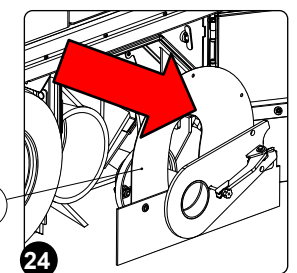
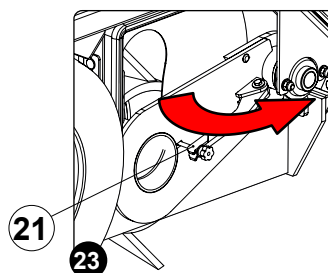
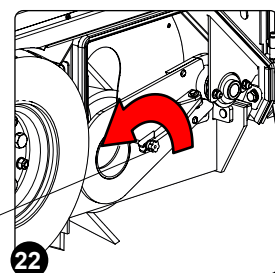
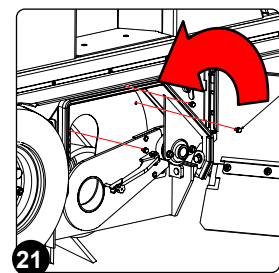
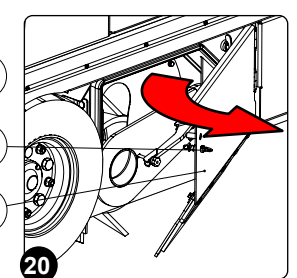
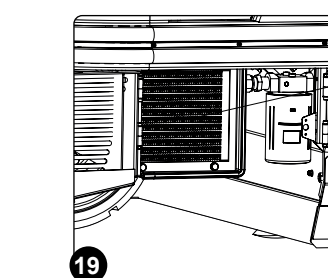
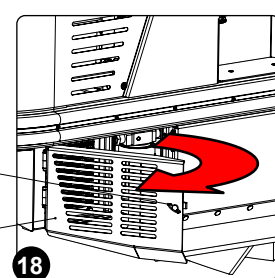
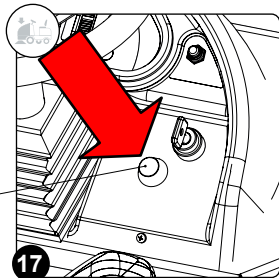
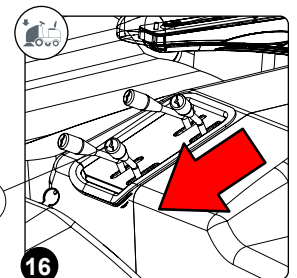
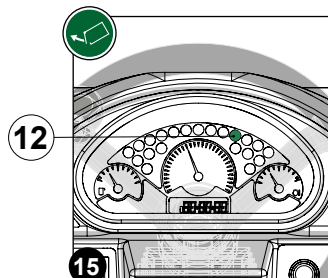
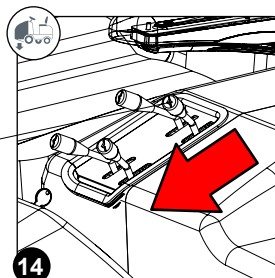
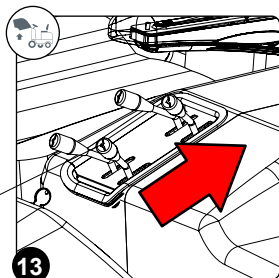
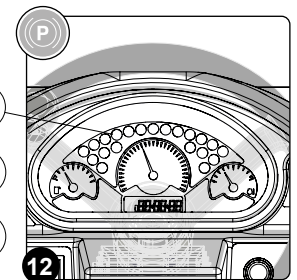
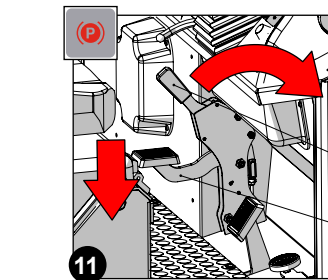
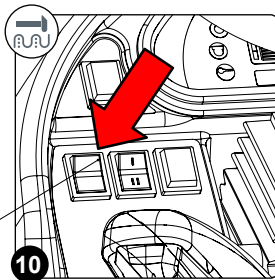
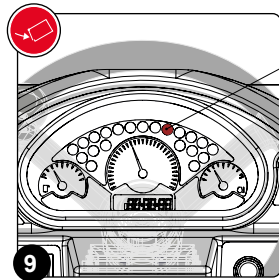
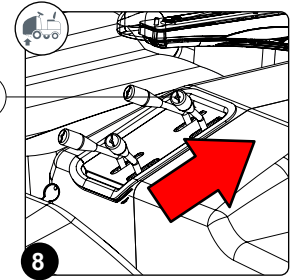
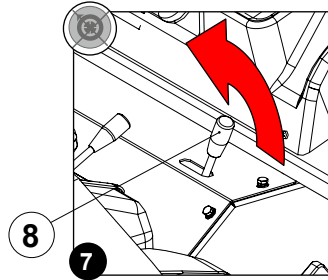
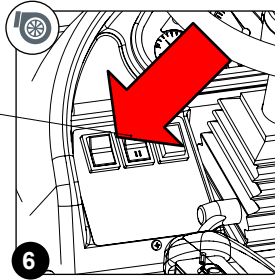
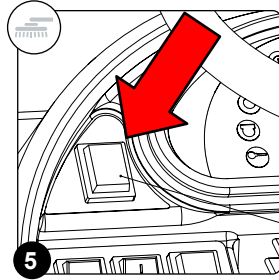
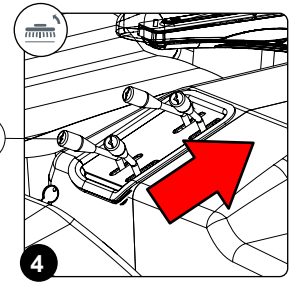
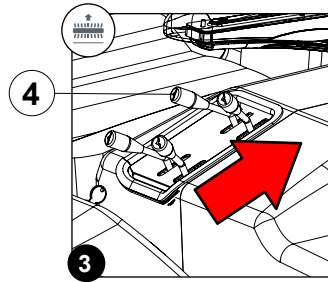
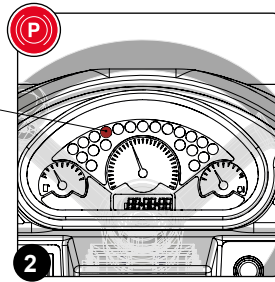
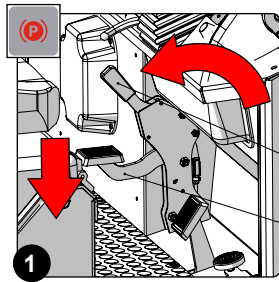
10. Once the maintenance work is finished, take the machine to its parking area.

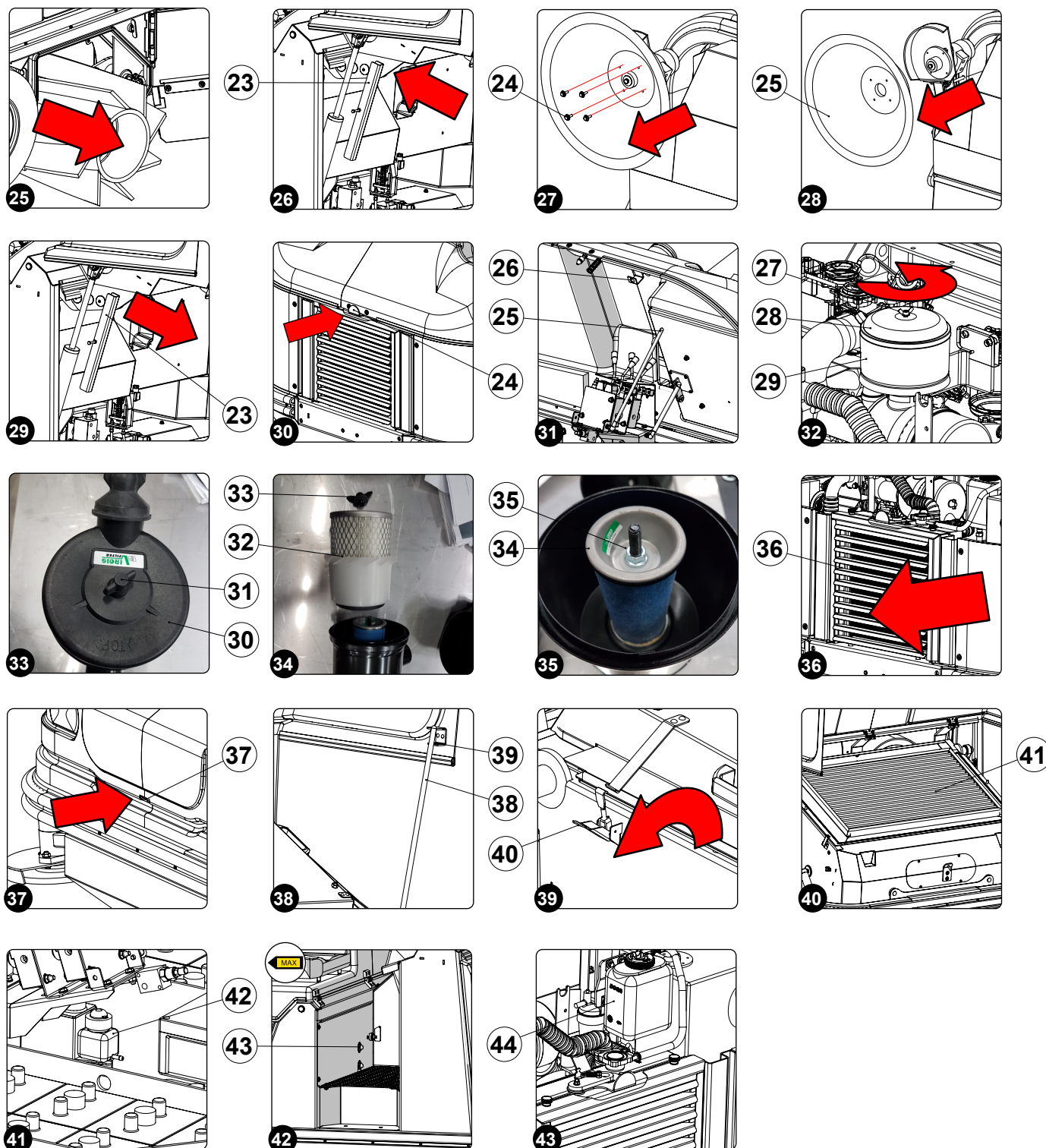
11. Secure the machine, see paragraph "MACHINE SAFETY" on page 18.

 **WARNING:** the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

 **ATTENTION:** Park the machine in an enclosed place, on a flat surface, and at a safe distance from any objects that could either damage it or be damaged due to contact with the machine itself.

ROUTINE MAINTENANCE





Before carrying out any extraordinary maintenance operations, proceed as follows:

1. Take the machine to the maintenance area.

WARNING: the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

2. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.

ATTENTION: It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out.

Version	Calculation	Upon delivery	Daily maintenance	After the first 50 hours	Every 50 hours	Every 150 hours	Every 300 hours	Every 500 hours	Every 1000 hours	Every 2000 hours	Every 3000 hours
B-D-BF	Hydraulic oil level check	C	C								
B-D-BF	Parking brake check		C								
B-D-BF	Brush cleaning		C								
B-D-BF	Central brush replacement						S (2)	S (2)	S (2)		
B-D-BF	Side brush replacement					S (3)	S (3)	S (3)	S (3)		
B-D-BF	External cleaning of hydraulic oil radiator			C							
B-D-BF	Brush adjustment check					S	S	S	S		
B-D-BF	Filter shaker operation check		C	C							
B-D-BF	Flap condition check			C							
B-D-BF	Flap replacement							S (4)	S (4)		
B-D-BF	Seal condition check (oil leaks)					S	S	S	S		
B-D-BF	Bearing greasing					S	S	S	S		
B-D-BF	Hydraulic oil replacement							S (1)	S (1)		
B-D-BF	Hydraulic oil filter replacement						S	S	S		
D-BF	Check for leaks in cooling circuit	C	C								
D-BF	Engine coolant check	C	C								
D-BF	Engine oil replacement			S				S	S		
D-BF	Engine oil replacement			S				S	S		
D-BF	Engine air filter cleaning			C							
D-BF	Engine air filter cleaning								S		
D-BF	Alternator belt check			C	C						
D-BF	Battery liquid level check			C		C	C	C	C		
D-BF	External cleaning of motor radiator			C							
D-BF	Fuel filter replacement							S	S		
D-BF	Motor alternator belt replacement								S		
D-BF	Tightening of screws and fuel fittings						S	S	S		
D-BF	Motor valve play check								S		
D-BF	Motor vent replacement									S	

Version	Calculation	Upon delivery	Daily maintenance	After the first 50 hours	Every 50 hours	Every 150 hours	Every 300 hours	Every 500 hours	Every 1000 hours	Every 2000 hours	Every 3000 hours
D-BF	Injector performance check										S

KEY:

B= battery-powered versions.

D= diesel versions.

BF= bi-fuel versions.

(1)= The first time after 500 hours, then every 1000 hours

(2)= Every 250 hours if the ground is smooth; every 150 hours if it is rough

(3)= Every 175 hours if the ground is smooth; every 100 hours if it is rough

(4)= Every 500 hours if the ground is smooth; every 300 hours if it is rough

B versions: for battery maintenance, respect the manufacturer's indications.

D-BF versions: for endothermic engine maintenance, respect the manufacturer's indications.

C= Tasks to be carried out by the user.

S= Tasks to be carried out by a COMAC service centre.

EMPTYING THE DEBRIS HOPPER

To empty the debris hopper, proceed as follows:

1. Make sure the machine is switched on. If it isn't, read "SWITCHING ON THE MACHINE" on page 30.
2. Engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**).

 **N.B.:** as soon as the parking brake is engaged, the relative red warning light (3) will be illuminated on the instrument panel (**Fig.2**).

3. Make sure the central brush is in its idle position. If it isn't, pull the lever (4) up (**Fig.3**).

 **N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.

4. Make sure the RH side brush is in its idle position. If it isn't, pull the lever (5) up (**Fig.4**).

 **N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.

 **N.B.:** for versions with a twin side brush (2SL versions), make sure the LH side brush is in its idle position. If it isn't, deactivate the LH side brush two-way switch (6) on the instrument panel (**Fig.5**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

5. Make sure the vacuum turbine is deactivated. If it isn't, deactivate the vacuum turbine command two-way switch (7) (**Fig.6**).

 **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.

 **ATTENTION:** for machines with a front vacuum kit, bring the turbine speed adjustment lever (8) to the central position (**Fig.7**). The lever is located next to the operator's seat.

6. Make sure the debris hopper hatch is closed. If it isn't, pull the lever (9) on the instrument panel upwards (**Fig.8**).

 **N.B.:** as soon as the debris hopper hatch is closed, the red warning light (10) will light up on the instrument panel to indicate that the hatch is in the idle position (**Fig.9**).

7. Activate the filter shaker by pressing the button (11) on the instrument panel (**Fig.10**).

 **ATTENTION:** Do not keep the switch (18) pressed longer than ten seconds; repeat this operation two or three times.

8. Release the parking brake, pressing the pedal (1) and turning the lever (2) clockwise (**Fig.11**).

 **N.B.:** as soon as the parking brake is disengaged, the relative red warning light (3) will be switched off on the instrument panel (**Fig.12**).

9. Take the machine to the debris dumping area. Stop it and engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**).

 **WARNING:** The place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

 **WARNING:** calculate the distance between the machine and the waste container correctly, bearing in mind the rotation radius of the debris hopper when moving.

10. Raise the debris hopper to its dumping position, pulling the lever (11) upwards (**Fig.13**).

11. Release the parking brake, pressing the pedal (1) and turning the lever (2) clockwise (**Fig.11**). Bring the machine next to the waste container so that the debris hopper is inside the container mouth.

 **WARNING:** reduce the machine movement speed when the debris hopper is lifted off the ground.

 **WARNING:** Avoid unloading the debris while the machine is sloped.

 **WARNING:** do not activate the filter shaker while the debris hopper is lifted off the ground.

12. Once the machine is in the debris dumping area, stop it and engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**).

13. Slowly open the debris hopper hatch by pushing the lever (9) on the instrument panel down (**Fig.14**).

 **N.B.:** as soon as the debris hopper is open, the refuse will start to come out.

 **N.B.:** as soon as the debris hopper hatch is open, the green indicator light (12) will light up on the instrument panel to indicate that the hatch is in the work position (**Fig.15**).

14. When all the debris has been dumped, close the debris hopper hatch by pulling the lever (9) on the instrument panel up (**Fig.8**).
15. Release the parking brake, pressing the pedal (1) and turning the lever (2) clockwise (**Fig.11**).
16. Move the machine away from the debris dumping area. Stop it and engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**).

 **WARNING:** reduce the machine movement speed when the debris hopper is lifted off the ground.

 **WARNING:** calculate the distance between the machine and the waste container correctly, bearing in mind the rotation radius of the debris hopper when moving.

17. Lower the debris hopper by pushing the lever (11) downwards (**Fig.16**).

 **N.B.:** apart from shifting the lever (11), the debris hopper will only move down if the "operator present" button (13) on the instrument panel is also pressed (**Fig.17**).

18. As soon as the debris hopper is in the work position, release the parking brake by pressing the pedal (1) and turning the lever (2) clockwise (**Fig.11**).

19. Take the machine to the designated machine storage place.

20. Secure the machine, see paragraph "MACHINE SAFETY" on page 18.

 **WARNING:** the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

 **ATTENTION:** Park the machine in an enclosed place, on a flat surface, and at a safe distance from any objects that could either damage it or be damaged due to contact with the machine itself.

CLEANING THE HYDRAULIC SYSTEM OIL RADIATOR

Thorough cleaning of the hydraulic system oil radiator guarantees enhanced efficiency and a longer working life for the hydraulic system. To clean the oil radiator, proceed as follows:

1. Go to the rear right-hand part of the machine and open the rear RH panel (14) by rotating the retainer (15) (**Fig.18**).
2. Clean the oil radiator (16) with the aid of a vacuum cleaner.

 **N.B.:** if necessary, clean the radiator with an air jet from inside the machine, facing outwards, and kept at a distance of more than 20cm.

 **ATTENTION:** check the condition of the radiator and contact a COMAC service centre to have it replaced if you notice any leaks or malfunctioning.

3. At the end of the work, close the rear RH panel.

CLEANING THE CENTRAL BRUSH

Thorough cleaning of the central brush guarantees enhanced working efficiency. To clean the brush, proceed as follows:

1. Go to the left-hand part of the machine and open the LH maintenance hatch (17) (**Fig.20**) after rotating the lock (18).
2. Remove the knobs (19) that hold the inspection panel (22) in place (**Fig.21**).
3. Loosen the knob (20) that holds the idler hub quick release lever (**Fig.22**).
4. Loosen the idler hub quick release lever (21) (**Fig.23**).
5. Remove the inspection panel (22) from the machine (**Fig.24**).
6. Extract the brush from inside the tunnel (**Fig.25**). Clean the brush under a stream of running water to remove any impurities from its bristles.

 **ATTENTION:** check the bristles are not excessively worn. If necessary, replace the brush (see "CENTRAL BRUSH REPLACEMENT" on page 49).

7. When the brush is clean, replace it by following the above steps in reverse order.

 **ATTENTION:** the brush is correctly fitted when, seen from above, the cusp shape forms an upturned "V" in the work direction.

CLEANING THE SIDE BRUSH

Thorough cleaning of the side brush guarantees enhanced working efficiency. To clean the brush, proceed as follows:

1. Make sure the machine is switched on. If it isn't, read "SWITCHING ON THE MACHINE" on page 30.
2. Engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**). The lever is located next to the operator's seat.
-  **N.B.:** as soon as the parking brake is engaged, the relative red warning light (3) will be illuminated on the instrument panel (**Fig.2**).
3. Check the side brush command arm is in the idle position (it must be inside the machine). If it isn't, pull the lever (5) upwards (**Fig.4**).
-  **N.B.:** if the machine is fitted with a left-hand side brush, activate the two-way switch (6) on the instrument panel before shifting the lever (5) (**Fig.5**).
-  **N.B.:** the two-way switch is active when the LED inside it is illuminated.
4. Make sure the debris hopper hatch is closed. If it isn't, pull the lever (9) upwards (**Fig.8**).
-  **N.B.:** as soon as the hatch is closed, the relative red warning light (10) will be illuminated on the instrument panel (**Fig.9**).
5. Raise the debris hopper to its dumping position, pulling the lever (11) upwards (**Fig.13**).
6. Get off the machine and insert the safety retainers (23) in the rods of the debris hopper command pistons (**Fig.26**).
7. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
8. Using suitable tools, remove the screws (24) from the brush-holder hub (**Fig.27**).
9. Remove the side brush (25) from the brush-holder hub (**Fig.28**).
10. Clean the brush under a stream of running water to remove any impurities from its bristles.
-  **ATTENTION:** check the bristles are not excessively worn. If necessary, replace the brush (see "SIDE BRUSH REPLACEMENT" on page 49).
11. When the brush is clean, use the screws you removed earlier to attach it to the hub.
12. Remove the safety retainers (23) from the rods of the debris hopper command pistons (**Fig.29**).
13. Run the machine switch-on procedure (see "SWITCHING ON THE MACHINE" on page 30).
14. Lower the debris hopper by pushing the lever (11) downwards (**Fig.16**).
-  **N.B.:** apart from shifting the lever (13), the debris hopper will only move down if the "operator present" button (22) on the instrument panel is also pressed (**Fig.17**).
-  **N.B.:** The necessary equipment is not supplied with the machine.

CLEANING THE AIR CYCLONE PRE-FILTER ON THE ENDOTHERMIC ENGINE INLET

Thorough cleaning of the cyclone pre-filter guarantees enhanced efficiency and a longer working life for the endothermic engine. To clean the cyclone pre-filter, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Remove the cover (28) of the cyclone filter, turning the knob (27) anti-clockwise (**Fig.32**).
4. Remove the filter (29) and clean it with a cloth.
5. When the filter (29) is clean and dry, refit it by following the above steps in reverse order.

CLEANING THE AIR FILTERING CARTRIDGES ON THE ENDOTHERMIC ENGINE INLET

Thorough cleaning of the filtering cartridges in the air filter on the endothermic engine inlet guarantees enhanced efficiency and a longer working life for the engine. To clean them, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Remove the cover (30) on the filter body after loosening the wing nut (31) (**Fig.33**).
4. Remove the primary cartridge (32) in the filter body after loosening the wing nut (33) (**Fig.34**).
5. Remove the safety cartridge (34) in the filter body after loosening the nut (35) (**Fig.35**).
-  **N.B.:** The necessary equipment is not supplied with the machine.
6. Clean the two filtering cartridges with a vacuum cleaner.

i **N.B.:** if necessary, clean the cartridges with an air jet from inside the machine, facing outwards, and kept at a distance of more than 20cm.

! **ATTENTION:** check the condition of the cartridges, replacing them if necessary (see "REPLACING THE AIR FILTERING CARTRIDGES ON THE ENDOTHERMIC ENGINE INLET" on page 50).

7. When the two cartridges are clean, refit them in the machine by following the above steps in reverse order.

! **ATTENTION:** when fitting the cover (30), make sure the "TOP" arrow is facing upwards.

CLEANING THE ENDOTHERMIC ENGINE COOLING SYSTEM RADIATOR

Thorough cleaning of the cooling system radiator guarantees enhanced efficiency and a longer working life for the endothermic engine. To clean the radiator, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Clean the cooling system radiator (36) with the aid of a vacuum cleaner (**Fig.36**).

i **N.B.:** if necessary, clean the radiator with an air jet from inside the machine, facing outwards, and kept at a distance of more than 20cm.

! **ATTENTION:** check the condition of the radiator and contact a COMAC service centre to have it replaced if you notice any leaks or malfunctioning.

CLEANING THE VACUUM FILTER

Thorough cleaning of the vacuum filter guarantees enhanced efficiency and a longer working life for the vacuum turbine. To clean the filter, proceed as follows:

1. Go to the front of the machine and open the hood by pressing the lever (37) (**Fig.37**).
2. Rotate the hood to the maintenance position, remembering to insert the rotation retainer pin (38) in the hole (39) on the hood (**Fig.38**).
3. Release the retainers (40) and remove the vacuum cover (**Fig.39**).

! **WARNING:** the following operations must be carried out by qualified personnel.

4. Remove the fabric filter (41) (**Fig.40**), taking care to detach it from the machine's electrical system before removing it completely.

i **N.B.:** position the fabric filter on a structure that can support it safely.

5. Clean the filter with a vacuum cleaner.

i **N.B.:** if necessary, clean the fabric filter with an air jet from inside, facing outwards, and kept at a distance of more than 20cm.

! **ATTENTION:** check the condition of the filter and contact a COMAC service centre to have it replaced if you notice any rips.

6. When the filter is clean, refit it by following the above steps in reverse order.

CLEANING THE DEBRIS HOPPER

Thorough cleaning of the debris hopper guarantees enhanced efficiency and a longer working life for the vacuum turbine. To clean the hopper, proceed as follows:

1. Make sure the machine is switched on. If it isn't, read "SWITCHING ON THE MACHINE" on page 30.
2. Engage the parking brake, pressing the pedal (1) fully down and turning the lever (2) anti-clockwise (**Fig.1**).

i **N.B.:** as soon as the parking brake is engaged, the relative red warning light (3) will be illuminated on the instrument panel (**Fig.2**).

3. Make sure the central brush is in its idle position. If it isn't, pull the lever (4) up (**Fig.3**).

i **N.B.:** as soon as the central brush begins to rise off the ground, its motor will stop working and the turbine will switch off too.

4. Make sure the RH side brush is in its idle position. If it isn't, pull the lever (5) up (**Fig.4**).

i **N.B.:** as soon as the side brush begins to rise off the ground, its motor will stop working.

-  **N.B.:** for versions with a twin side brush (2SL versions), make sure the LH side brush is in its idle position. If it isn't, deactivate the LH side brush two-way switch (6) on the instrument panel (**Fig.5**).
-  **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.
- 5. Make sure the vacuum turbine is deactivated. If it isn't, deactivate the vacuum turbine command two-way switch (7) (**Fig.6**).
-  **N.B.:** the two-way switch is deactivated when the LED inside it is not illuminated.
-  **ATTENTION:** for machines with a front vacuum kit, bring the turbine speed adjustment lever (8) to the central position (**Fig.7**). The lever is located next to the operator's seat.
- 6. Make sure the debris hopper hatch is open. If it isn't, push the lever (9) on the instrument panel down (**Fig.14**).
-  **N.B.:** as soon as the debris hopper hatch is open, the green indicator light (12) will light up on the instrument panel to indicate that the hatch is in the work position (**Fig.15**).
- 7. Secure the machine, see paragraph "MACHINE SAFETY" on page 18.
- 8. Go to the front of the machine and open the hood by pressing the lever (2) (**Fig.38**).
- 9. Rotate the hood to the maintenance position, remembering to insert the rotation retainer pin (3) in the hole (4) on the hood (**Fig.39**).
- 10. Release the retainers (5) and remove the vacuum cover (**Fig.40**).
-  **WARNING:** the following operations must be carried out by qualified personnel.
- 11. Remove the fabric filter, taking care to detach it from the machine's electrical system before removing it completely.
-  **N.B.:** position the fabric filter on a structure that can support it safely.
- 12. Clean the inside of the hopper with a jet of water.
- 13. When the inside of the hopper is clean and dry, reposition the fabric filter and close the hood.

CHECKING THE BRAKE SYSTEM OIL

To check the oil level in the braking system, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Check the oil level in the basin (42) (**Fig.41**) is between the MIN and MAX symbols. If it isn't, top it up (see "TOPPING UP THE BRAKE SYSTEM OIL" on page 50).

CHECKING THE HYDRAULIC SYSTEM OIL

To check the oil level in the hydraulic system, proceed as follows:

1. Go to the right-hand side of the machine and check that the hydraulic system oil level is visible via the MAX level bulb (43) (**Fig.42**). If the level is lower than the MIN, top it up (see "TOPPING UP THE HYDRAULIC SYSTEM OIL" on page 50).

CHECKING THE ELECTROLYTE LEVEL (BATTERY-POWERED VERSIONS)

To check the level of electrolyte in the battery case, proceed as follows:

1. At the end of the daily battery case recharging, go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).

 **WARNING:** the following operations must be carried out by qualified personnel.

3. Check the level of electrolyte visually by opening the caps in the individual cells; if necessary, top up with distilled water.

 **N.B.:** for battery case maintenance, follow the manufacturer's or retailer's instructions scrupulously.

CHECKING THE LIQUID LEVEL IN THE ENDOTHERMIC ENGINE COOLING SYSTEM

To check the level of liquid in the cooling system, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Check the liquid level in the cooling system basin (44) (**Fig.43**) is between the MIN and MAX symbols. If it isn't, top it up (see "TOPPING UP THE ENDOTHERMIC ENGINE COOLANT" on page 50).

MAINTENANCE OF THE ENDOTHERMIC ENGINE

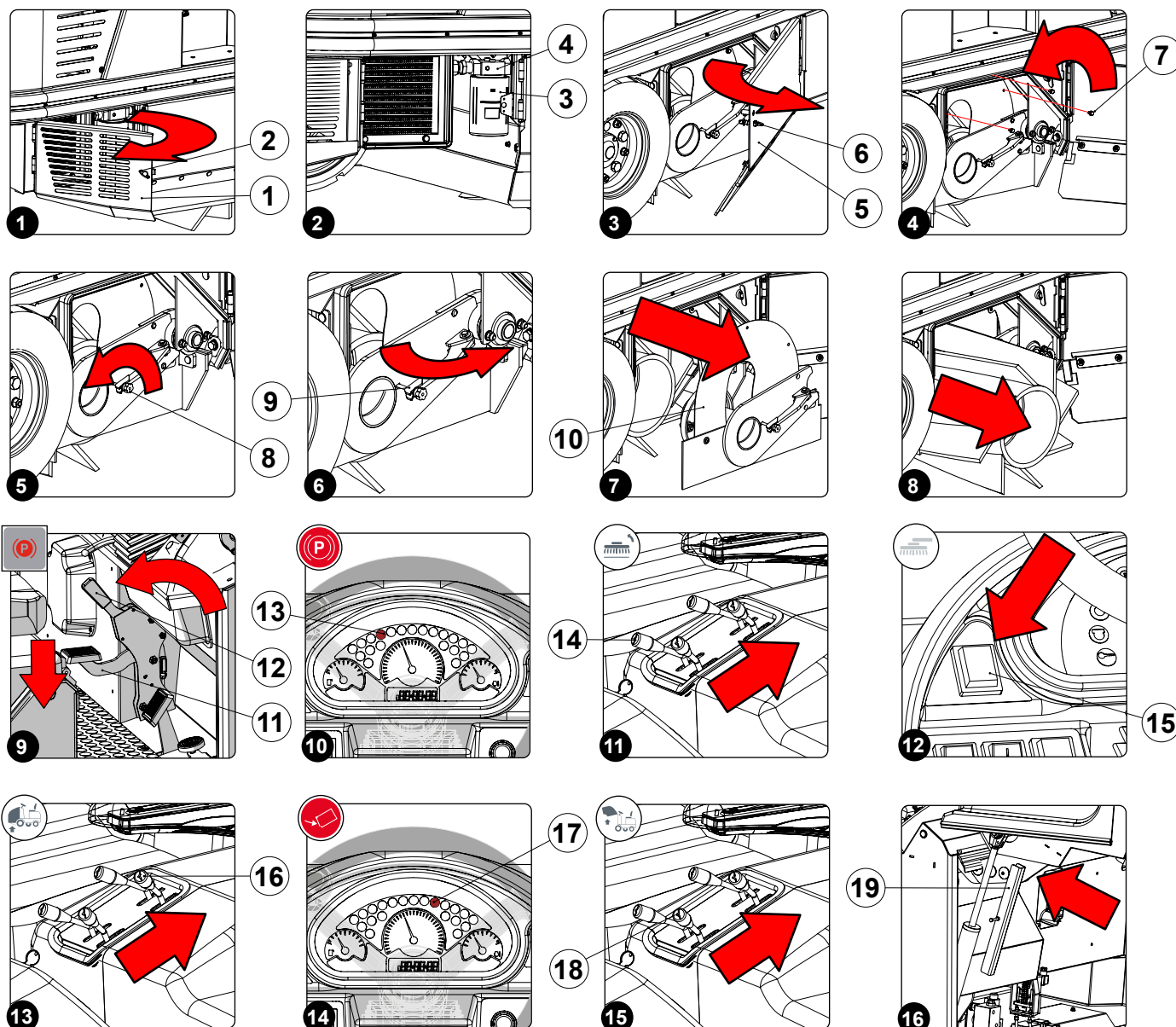
To carry out maintenance on the endothermic engine, proceed as follows:

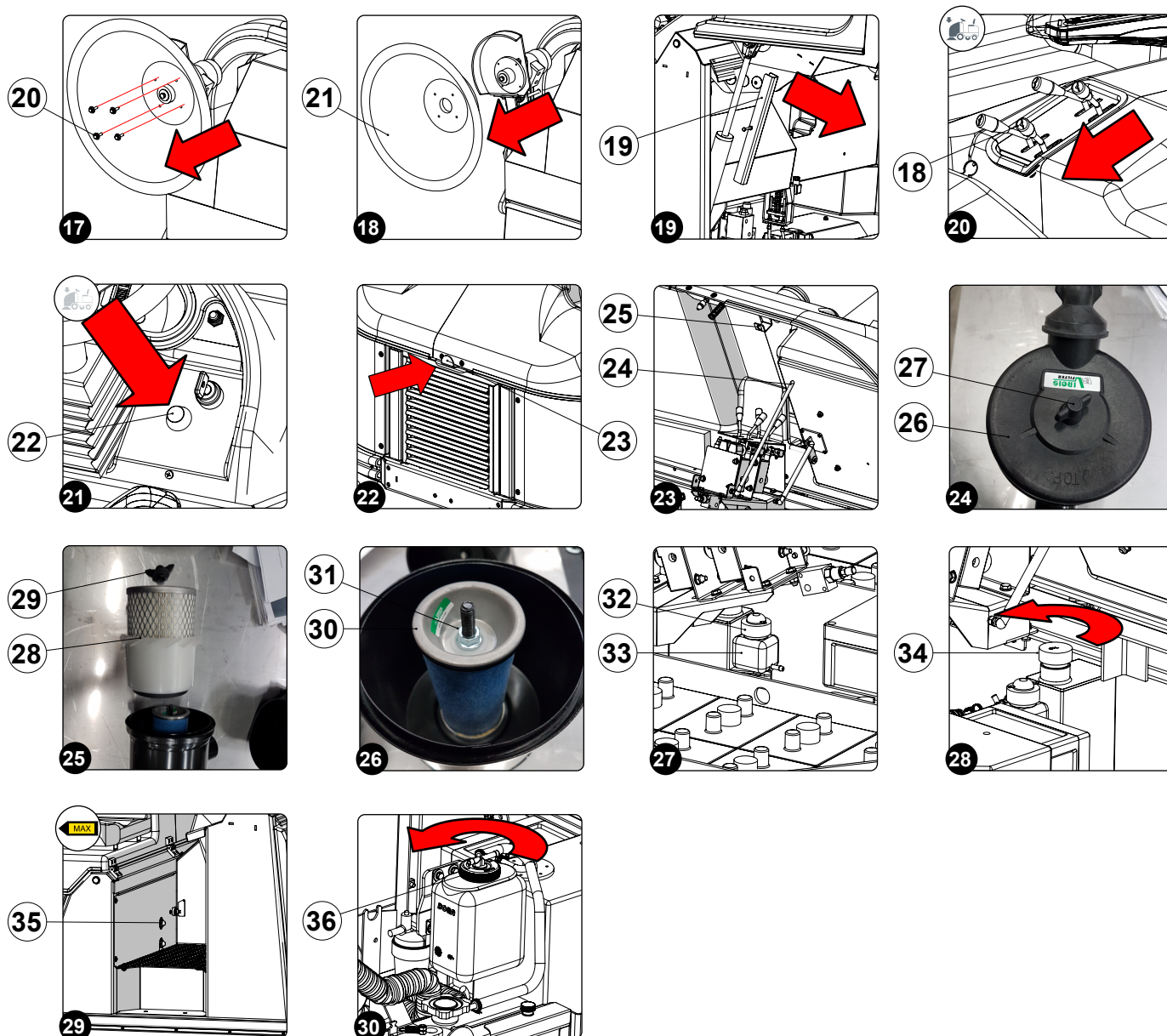
1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).

WARNING: the following operations must be carried out by qualified personnel.

N.B.: for endothermic engine maintenance, follow the manufacturer's instructions scrupulously; read the MAINTENANCE chapter in the engine use and maintenance manual (consigned together with the machine).

EXTRAORDINARY MAINTENANCE WORK





Before carrying out any extraordinary maintenance operations, proceed as follows:

1. Take the machine to the maintenance area.

WARNING: the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

2. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.

ATTENTION: It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out.

REPLACING THE HYDRAULIC SYSTEM FILTER CARTRIDGE

To replace the hydraulic system filter cartridge, proceed as follows:

1. Go to the rear right-hand part of the machine and open the rear RH panel (1) by rotating the retainer (2) (**Fig.1**).
2. Remove the cartridge (3) from the filter body (4) (**Fig.2**) by rotating it clockwise.

i **N.B.:** if necessary, use the filter wrench.

ATTENTION: it's a good idea to place a container underneath the filter body to avoid getting any oil on the floor.

ATTENTION: it's a good idea not to re-use the oil in the cartridge as it will be full of contaminating particles.

3. Screw in the new filter cartridge until it reaches the stop on the filter body.

 **ATTENTION:** before screwing in the new filter cartridge, lubricate the O-ring on it.

 **ATTENTION:** once the end stop has been reached, tighten the cartridge manually by another 1/2 turn.

4. At the end of the work, close the rear RH panel.

CENTRAL BRUSH REPLACEMENT

To replace the central brush, proceed as follows:

1. Go to the left-hand part of the machine and open the LH maintenance hatch (5) (**Fig.3**) after rotating the lock (6).
2. Remove the knobs (7) that hold the inspection panel in place (**Fig.4**).
3. Loosen the knob (8) that holds the idler hub quick release lever (**Fig.5**).
4. Loosen the idler hub quick release lever (9) (**Fig.6**).
5. Remove the inspection panel (10) from the machine (**Fig.7**).
6. Take the old brush out of the tunnel and replace it with the new one (**Fig.8**).

 **ATTENTION:** the brush is correctly fitted when, seen from above, the cusp shape forms an upturned "V" in the work direction.

 **ATTENTION:** as soon as the new central brush has been positioned, adjust it (see "CENTRAL BRUSH ADJUSTMENT" on page 51).

SIDE BRUSH REPLACEMENT

To replace the side brush, proceed as follows:

1. Make sure the machine is switched on. If it isn't, read "SWITCHING ON THE MACHINE" on page 30.
2. Engage the parking brake, pressing the pedal (11) fully down and turning the lever (12) anti-clockwise (**Fig.9**). The lever is located next to the operator's seat.

 **N.B.:** as soon as the parking brake is engaged, the relative red warning light (13) will be illuminated on the instrument panel (**Fig.10**).

3. Check the side brush command arm is in the idle position (it must be inside the machine). If it isn't, pull the lever (14) upwards (**Fig.11**).

 **N.B.:** if the machine is fitted with a left-hand side brush, activate the two-way switch (15) on the instrument panel before shifting the lever (14) (**Fig.12**).

 **N.B.:** the two-way switch is active when the LED inside it is illuminated.

4. Make sure the debris hopper hatch is closed. If it isn't, pull the lever (16) upwards (**Fig.13**).

 **N.B.:** as soon as the hatch is closed, the relative red warning light (17) will be illuminated on the instrument panel (**Fig.14**).

5. Raise the debris hopper to its dumping position, pulling the lever (18) upwards (**Fig.15**).
6. Get off the machine and insert the safety retainers (19) in the rods of the debris hopper command pistons (**Fig.16**).
7. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.
8. Using suitable tools, remove the screws (20) from the brush-holder hub (**Fig.17**).
9. Remove the side brush (21) from the brush-holder hub (**Fig.18**).
10. Position the new side brush in the brush-holder hub.
11. Use the screws you removed earlier to attach the side brush to the hub.
12. Remove the safety retainers (19) from the rods of the debris hopper command pistons (**Fig.19**).
13. Run the machine switch-on procedure (see "SWITCHING ON THE MACHINE" on page 30).
14. Lower the debris hopper by pushing the lever (18) downwards (**Fig.20**).

 **N.B.:** apart from shifting the lever (18), the debris hopper will only move down if the "operator present" button (22) on the instrument panel is also pressed (**Fig.21**).

 **N.B.:** The necessary equipment is not supplied with the machine.

 **ATTENTION:** as soon as the new side brush has been positioned, adjust it (see "ADJUSTING SIDE BRUSH" on page 51).

REPLACING THE AIR FILTERING CARTRIDGES ON THE ENDOTHERMIC ENGINE INLET

To replace the filter cartridges in the air filter on the endothermic engine inlet, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (23) (**Fig.22**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (24) in the hole (25) on the tailgate (**Fig.23**).
3. Remove the cover (26) on the filter body after loosening the wing nut (27) (**Fig.24**).
4. Remove the primary cartridge (28) in the filter body after loosening the wing nut (29) (**Fig.25**).
5. Remove the safety cartridge (30) in the filter body after loosening the nut (31) (**Fig.26**).



N.B.: The necessary equipment is not supplied with the machine.

6. Replace the two old filter cartridges with the new ones.
7. Fit them in the machine by following the above steps in reverse order.



ATTENTION: when fitting the cover (30), make sure the "TOP" arrow is facing upwards.

TOPPING UP THE BRAKE SYSTEM OIL

To top up the oil level in the braking system, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (24) (**Fig.30**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (25) in the hole (26) on the tailgate (**Fig.31**).
3. Loosen the cap (32) on the basin (33) (**Fig.27**) and top up the oil level.



N.B.: the level must be between the MAX and MIN marks on the basin.



WARNING: use only "ORIGINAL ATE BRAKE FLUID SL.6 (DOT 4)" oil.

TOPPING UP THE HYDRAULIC SYSTEM OIL

To top up the oil level in the hydraulic system, proceed as follows:

1. Go to the back of the machine and open the tailgate by pressing the lever (23) (**Fig.22**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (24) in the hole (25) on the tailgate (**Fig.23**).
3. Loosen the cap (34) on the hydraulic system oil tank (**Fig.28**).
4. Fill the tank with new oil.



N.B.: The oil level must be visible via the MAX level bulb (35) (**Fig.29**).



WARNING: use only "ENI ARNICA 46" oil.

TOPPING UP THE ENDOTHERMIC ENGINE COOLANT

To top up the coolant level in the endothermic engine cooling system, proceed as follows:



WARNING: this operation must only be carried out when the coolant in the cooling system is cold, to avoid any risk of injury.

1. Go to the back of the machine and open the tailgate by pressing the lever (23) (**Fig.22**).
2. Rotate the tailgate to the maintenance position, remembering to insert the rotation retainer pin (24) in the hole (25) on the tailgate (**Fig.23**).
3. Loosen the cap (36) on the coolant tank (**Fig.30**).
4. Fill the tank with new coolant.

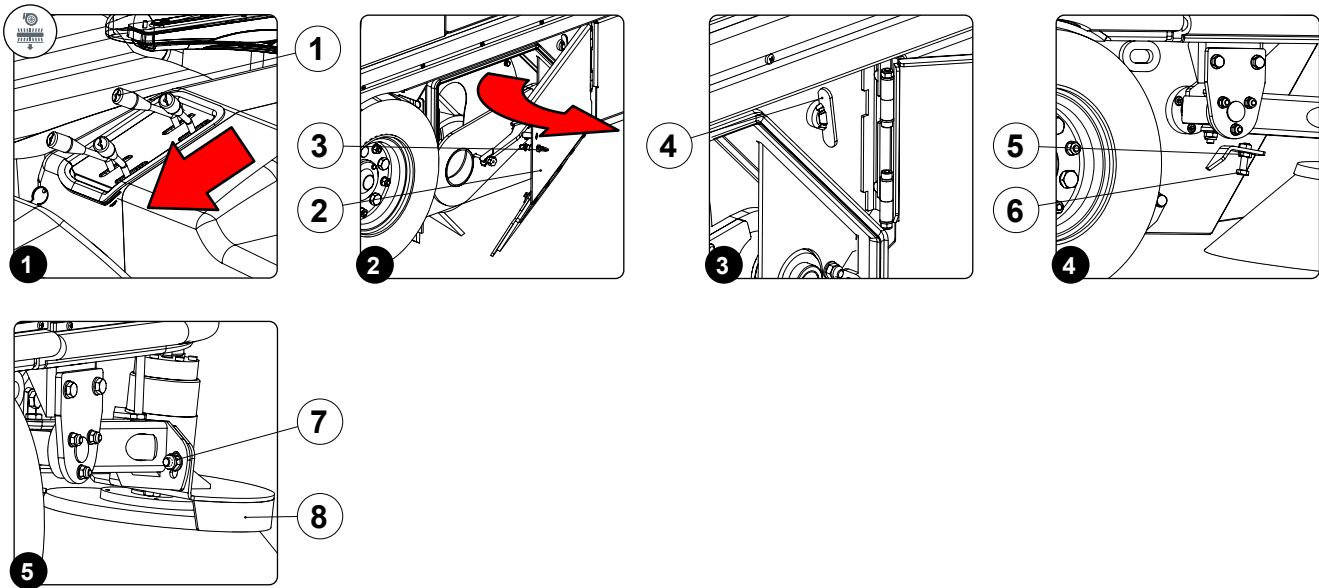


N.B.: the level must be between the MAX and MIN marks on the basin.



WARNING: use only "ENI ANTIFREEZE READY" coolant.

ADJUSTMENT INTERVENTIONS



Before carrying out any adjustments, proceed as follows:

1. Take the machine to the maintenance area.

WARNING: the place designated for this operation must comply with current regulations concerning safety at work and current environmental protection regulations.

2. Carry out the steps necessary to secure the machine, see paragraph "MACHINE SAFETY" on page 18.

ATTENTION: It is recommended to wear the appropriate PPE (Personal Protective Equipment), suitable for the work to be carried out.

CENTRAL BRUSH ADJUSTMENT

If the central brush does not channel the dirt effectively towards the debris hopper, you must adjust its height in relation to the ground. Proceed as follows:

1. Sit on the driver's seat.
2. Switch on the machine (see "SWITCHING ON THE MACHINE" on page 30).
3. Bring the central brush to its work position by pushing the lever (1) down (**Fig.1**).

i N.B.: only when the central brush is in the work position will its motor begin working, and also the turbine.

4. Go to the left-hand part of the machine and open the LH maintenance hatch (2) (**Fig.2**) after rotating the lock (3).
5. To increase or reduce the height of the central brush from the ground, use the knob (4) (**Fig.3**).

i N.B.: rotate the knob (4) anti-clockwise to reduce the distance between the brush and the ground. Rotate the knob (4) clockwise to increase the distance between the brush and the ground.

i N.B.: the central brush is correctly adjusted when its work imprint is no wider than a couple of centimetres.

ADJUSTING SIDE BRUSH

If the side brush does not channel the dirt effectively towards the debris hopper, adjust its height in relation to the ground. Proceed as follows:

1. Go to the side of the machine and loosen the counternut (5) holding the adjustment screw (6) (**Fig.4**).
2. To reduce the height of the side brush from the ground, loosen the adjustment screw (6).

i N.B.: To increase the height of the side brush from the ground, tighten the adjustment screw (6).

3. After completing the adjustment, tighten the counternut (5).
4. To increase the tilt of the side brush in relation to the ground, loosen the self-locking nut (7) and rotate the side brush support (8) towards the outside of the machine (**Fig.5**).

i N.B.: to reduce the tilt, rotate the side brush support (8) towards the inside of the machine.

5. The side brush is correctly adjusted when its front bristles are bent by half their length in the work position.

6. After completing the adjustment, tighten the self-locking nut (7).

i N.B.: The side brush is correctly adjusted when its front bristles are bent by half their length in the work position.

w N.B.: The necessary equipment is not supplied with the machine.

DISPOSAL



Dispose of the machine in accordance with the waste disposal regulations in force in the country in which the machine is being used.

TYPE OF BRUSHES USED

TYPE OF BRUSHES FOR CS100 MACHINE VERSIONS

CODE	QTY	EXTERNAL Ø [mm]	SHAFT LENGTH [mm]	TYPE OF BRISTLE	NOTES
424902	1	380	1000	PPL 1.1+0.7	Cylindrical brush, black + white, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1000mm (PPL front row bristles $\varnothing 0.7$ wavy + PPL rear row bristles $\varnothing 1.1$ knurled)
424904	1	380	1000	PPL 0.7	Cylindrical brush, white, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1000mm (PPL bristles $\varnothing 0.7$ wavy)
424906	1	380	1000	PPL 1.4	Cylindrical brush, black, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1000mm (PPL bristles $\varnothing 1.4$)
411695	1+1	500	-	PPL 1.1 ACC 0.7	Discoidal brush, black, with $\varnothing_E=500\text{mm}$ $\varnothing_F=250\text{mm}$ (PPL bristles $\varnothing 1.1$ + STEEL 0.7)
424909	1+1	500	-	PPL 1.5	Discoidal brush, white, with $\varnothing_E=500\text{mm}$ $\varnothing_F=250\text{mm}$ (PPL bristles $\varnothing 1.5$)

TYPE OF BRUSHES FOR CS120 MACHINE VERSIONS

CODE	QTY	EXTERNAL Ø [mm]	SHAFT LENGTH [mm]	TYPE OF BRISTLE	NOTES
424903	1	380	1200	PPL 1.1+0.7	Cylindrical brush, black + white, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1200mm (PPL front row bristles $\varnothing 0.7$ wavy + PPL rear row bristles $\varnothing 1.1$ knurled)
424905	1	380	1200	PP 0.7	Cylindrical brush, white, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1200mm (PPL bristles $\varnothing 0.7$ wavy)
424907	1	380	1200	PPL 1.4	Cylindrical brush, black, with $\varnothing_E=380\text{mm}$ $\varnothing_F=225\text{mm}$ L=1200mm (PPL bristles $\varnothing 1.4$)
411695	1+1	500	-	PPL 1.1 ACC 0.7	Discoidal brush, black, with $\varnothing_E=500\text{mm}$ $\varnothing_F=250\text{mm}$ (PPL bristles $\varnothing 1.1$ + STEEL 0.7)
424909	1+1	500	-	PPL 1.5	Discoidal brush, white, with $\varnothing_E=500\text{mm}$ $\varnothing_F=250\text{mm}$ (PPL bristles $\varnothing 1.5$)

TROUBLESHOOTING

This chapter lists the most common problems linked with the use of the machine. If you are unable to resolve the problems with the information given here, please contact your nearest assistance centre.

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE MACHINE DOES NOT START	The main switch is set to "0".	Check the main switch is set to "I". Otherwise, switch on the machine (see "SWITCHING ON THE MACHINE" on page 30).
	Make sure no alarm indicator lights are active on the instrument panel after the machine switch-on phase.	Contact your nearest COMAC service centre.
	For battery-powered versions, make sure the battery boxes are correctly connected to each other and that the battery box connector is joined to the electrical system connector.	Connect the battery boxes correctly to each other (see "CONNECTING THE BATTERIES (BATTERY VERSIONS)" on page 22).
		Connect the battery box cable correctly to the electrical system cable (see "CONNECTING THE BATTERIES (BATTERY VERSIONS)" on page 22).
	For battery-powered versions, check the battery box charge level.	If the battery box charge level is critical, run a complete charging cycle (see "RECHARGING THE BATTERIES (BATTERY VERSIONS)" on page 22).
	For versions with an endothermic engine, make sure the starter battery is properly connected to the electrical system connector.	Connect the starter battery cable correctly to the electrical system cable (see "CONNECTING THE BATTERY (VERSIONS WITH ENDOTHERMIC ENGINE)" on page 23).
	For versions with an endothermic engine, check the starter battery charge level.	If the starter battery charge level is critical, run a complete charging cycle (if envisaged for the type of battery) or replace it if necessary.
	For versions with an endothermic engine, check the fuel level.	If the fuel level is critical, top it up (see "REFUELLING" on page 24).
		If the LPG gas level in the cylinder is critical, replace the cylinder (see "LPG CYLINDER INSERTION" on page 25).
	For versions with an endothermic engine, make sure the inlet air filter is not clogged.	If the air filter on the engine inlet is clogged, clean it (see "CLEANING THE AIR CYCLONE PRE-FILTER ON THE ENDOTHERMIC ENGINE INLET" on page 44 and "CLEANING THE AIR FILTERING CARTRIDGES ON THE ENDOTHERMIC ENGINE INLET" on page 44).
THE BATTERIES ARE NOT CHARGED CORRECTLY	The machine is fitted with power fuses, arranged in the electrical box, to protect against short-circuiting.	Contact your nearest COMAC service centre if they need to be replaced.
	The endothermic engine does not start.	If the endothermic engine does not start, check the diagnostics in the engine use and maintenance manual (consigned together with the machine).
	The connector of the battery charger cable is not properly inserted in the battery connector.	Connect the battery charger cable connector to the battery connector again.
	The plug on the battery charger's power cable is not correctly inserted into the electrical outlet.	Connect the battery charger power cable plug to the mains socket.
THE MACHINE HAS A VERY LOW WORKING AUTONOMY	The characteristics of the mains power supply do not correspond to those required by the battery charger.	Check that the characteristics in the battery charger plate are the same as those of the mains supply.
	The LEDs of the battery charger blink repeatedly.	Referring to the battery charger use and maintenance manual, check the meaning of the flashing signals that the battery charger emits during the battery recharge stage.
	For battery-powered versions, check the battery charge level (check the symbol on the instrument panel).	If the battery charge level is critical, perform a complete charge cycle - see "RECHARGING THE BATTERIES (BATTERY VERSIONS)" on page 22.
	For versions with an endothermic engine, check the fuel level.	If the fuel level is critical, top it up (see "REFUELLING" on page 24).
		If the LPG gas level in the cylinder is critical, replace the cylinder (see "LPG CYLINDER INSERTION" on page 25).

PROBLEM	POSSIBLE CAUSE	SOLUTION
THE MACHINE DOES NOT MOVE	The machine does not start.	Read the section THE MACHINE DOES NOT START.
	The parking brake is engaged.	Sit on the driver's seat and release the parking brake.
	The nut on the bypass valve, which enables standby status, is not properly tightened.	Tighten the nut on the bypass valve.
THE MACHINE DOES NOT CLEAN CORRECTLY	The machine does not start.	Read the section THE MACHINE DOES NOT START.
	The brushes have not been inserted correctly in the machine.	Check the central brush is correctly inserted in the machine.
		Check the side brush is correctly inserted in the machine.
	The type of brush used is not suitable for the dirt to be cleaned.	Check that the brushes on the machine are adequate for the work to be carried out, contact the nearest technical assistance centre.
	The brush bristles are excessively worn.	Check the state of wear of the central brush is acceptable for the task to be carried out. If it isn't, replace it (see "CENTRAL BRUSH REPLACEMENT" on page 49).
		Check the state of wear of the side brush is acceptable for the task to be carried out. If it isn't, replace it (see "SIDE BRUSH REPLACEMENT" on page 49).
	The brushes are not working properly.	If the central brush is in the idle position, lower the central brush command lever.
		If the side brush is in the idle position, lower the side brush command lever.
		If the LH side brush is in the idle position, press the LH side brush command two-way switch.
		Remove any debris that is preventing the brush from rotating smoothly.
		If the debris hopper is not correctly lowered, lower the hopper command lever.
	The brushes are not cleaning properly.	If the central brush is not correctly positioned in relation to the ground, adjust it (see "CENTRAL BRUSH ADJUSTMENT" on page 51).
		If the side brush is not correctly positioned in relation to the ground, adjust it (see "ADJUSTING SIDE BRUSH" on page 51).
	The debris hopper is too full.	If the debris hopper is too full, empty it (see "EMPTYING THE DEBRIS HOPPER" on page 42).
EXCESSIVE NOISE FROM THE CENTRAL BRUSH	Dirt wrapped around the brush.	Remove any dirt wrapped around the central brush (see "CLEANING THE CENTRAL BRUSH" on page 43).
EXCESSIVE NOISE FROM THE SIDE BRUSH	Dirt wrapped around the brush.	Remove any dirt wrapped around the side brush (see "CLEANING THE SIDE BRUSH" on page 44).

PROBLEM	POSSIBLE CAUSE	SOLUTION
EXCESSIVE DUST PRODUCTION	Vacuum system disabled.	If the vacuum system is disabled, turn it on by pressing the switch on the instrument panel. For versions with front vacuum, rotate the turbine command lever near the driver's seat clockwise.
	Clogged vacuum filter.	Remove any dirt wrapped around the vacuum filter (see "CLEANING THE VACUUM FILTER" on page 45).
	The debris hopper is too full.	If the debris hopper is too full, empty it (see "EMPTYING THE DEBRIS HOPPER" on page 42).
	Dust seal flaps no longer in good condition.	Contact your nearest COMAC service centre if they need to be replaced.
	The brushes are not correctly positioned in relation to the ground.	If the central brush is not correctly positioned in relation to the ground, adjust it (see "CENTRAL BRUSH ADJUSTMENT" on page 51).
		If the side brush is not correctly positioned in relation to the ground, adjust it (see "ADJUSTING SIDE BRUSH" on page 51).
	Debris hopper hatch open.	If the debris hopper hatch is not correctly lowered, lower the hopper hatch command lever.
		Remove any debris that is preventing the debris hopper hatch from opening correctly.
THE MACHINE DOES NOT VACUUM CORRECTLY	The central brush is not correctly inserted in the machine.	If the central brush is not correctly positioned in the machine, disassembly it and then refit it properly (see "CENTRAL BRUSH REPLACEMENT" on page 49).
	Vacuum system disabled.	If the vacuum system is disabled, turn it on by pressing the switch on the instrument panel. For versions with front vacuum, rotate the turbine command lever near the driver's seat clockwise.
	Clogged vacuum filter.	Remove any dirt wrapped around the vacuum filter (see "CLEANING THE VACUUM FILTER" on page 45).

EC DECLARATION OF CONFORMITY



The undersigned manufacturer:

COMAC S.p.A.
Via Maestri del Lavoro, 13
37059 Santa Maria di Zevio (VR)

declares under its sole responsibility that the products

SWEEPING MACHINES mod.

CS100 B - CS100 D - CS120 B - CS120 D - CS120 BF

comply with the requirements of the following Directives:

- 2006/42/EC: Machinery Directive.
- 2014/30/EU: Electromagnetic compatibility directive.
- 2000/14/EC: Directive by the European Parliament and Council date 8th May, 2000. Noise emission by machines and equipment for outdoor use.

MODEL	LwA [dB(A)]	LwA guaranteed [dB(A)]
CS100 B	86,2	93
CS100 D	97,3	102
CS120 B	86,2	93
CS120 D	97,3	102
CS120 BIFUEL	97,3	102

They also comply with the following standards:

- EN 60335-1:2012/A1:2019/A2:2019/A14:2019
- EN 60335-2-72:2012
- EN 12100:2010
- EN 61000-6-2:2005/AC:2005
- EN 61000-6-3:2007/A1:2011/AC:2012
- EN 62233:2008/AC:2008

The person authorized to compile the technical file:

Mr. Giancarlo Ruffo
Via Maestri del Lavoro, 13
37059 Santa Maria di Zevio (VR) - ITALY

Santa Maria di Zevio (VR), 02/12/2020

Comac S.p.A.
Legal representative
Giancarlo Ruffo

UK DECLARATION OF CONFORMITY

UK
CA

The undersigned manufacturer:

COMAC S.p.A.
Via Maestri del Lavoro, 13
37059 Santa Maria di Zevio (VR)

declares under its sole responsibility that the products

SWEEPING MACHINES mod.

CS100 B - CS100 D - CS120 B - CS120 D - CS120 BF

comply with the requirements of the following Directives:

- Supply of Machinery (Safety) Regulations 2008.
- Electromagnetic Compatibility Regulations 2016.
- Noise Emission in the Environment by Equipment for use Outdoors Regulations 2001.

MODEL	LwA [dB(A)]	LwA guaranteed [dB(A)]
CS100 B	86,2	93
CS100 D	97,3	102
CS120 B	86,2	93
CS120 D	97,3	102
CS120 BIFUEL	97,3	102

They also comply with the following standards:

- BS EN 60335-1:2012+A2:2019
- BS EN 60335-2-72:2012
- BS EN 12100:2010
- BS EN IEC 61000-6-2:2019
- BS EN 61000-6-3:2007+A1:2011
- BS EN 62233:2008

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Via Maestri del Lavoro, 13
37059 Santa Maria di Zevio (VR) - ITALY

Santa Maria di Zevio (VR), 02/12/2020

Comac S.p.A.
Legal representative
Giancarlo Ruffo

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