FRESIA S.p.A. Heavy duty equipment

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USE & MAINTENANCE MANUAL

SNOWBLOWER VEHICLE

F90 STI

September 2019

Date	Review Nr.	Reason

GENERAL INDEX

CHAPTER 4 _ INSTRUCTION FOR THE USE

CHAPTER 5 _ MAINTENANCE

INTRODUCTION

Paragraph *Page*

1.1 GENERAL INFORMATION

1.1.1 Introduction

Dear Customer, we wish to thank you for having chosen and purchased a **FRESIA SNOWBLOWER F90 STI.**

Vehicle good performance and lifetime are strictly linked to its correct use and to its accurate and appropriate maintenance.
Only the use of original spare parts and the intervention of our skilled technical staff can assure the best possible efficiency of the equipment you have purchased.
We allow ourselves accordingly to recommend to entrust EXCLUSIVELY our Technical After-sales and Spare Parts Service with the maintenance of FRESIA vehicles. We also suggest to avoid installing or replacing any component without having previously got manufacturer's authorization.
We trust you will understand the importance of what above from the technical point of view, the main purpose being to avoid any problem to our Customers.

This manuals will supply you with all necessary information for a correct maintenance of your F90 STI equipment. Should anyway any part of it not being clear enough, please do not hesitate to contact our Technical Staff directly.
You are kindly requested to read every part of this manual carefully and to fully respect the instructions it contains. Any procedure or advice you are going to read, even if apparently obvious, aims at building user's knowledge of the equipment and at the total fulfilment of all necessary safety operating conditions. For this reason, the information contained in the manual have to be forwarded to all staff who's going to use the equipment.

We remain at your full disposal for any possible need.

Yours faithfully,

FRESIA S.P.A.

1.1.2 Quality System certification

FRESIA S.p.A. has got the certification as a company operating within a quality system complying with UNI EN ISO 9001 regulations and with the even stricter TUV requirements as far as application field "design, development, manufacturing, maintenance and assistance of aircraft towing tractors, fire fighting vehicles, special vehicles and snow removal equipment for airports and roads" is concerned.

Customers' satisfaction, staff's efficiency and motivation, as global services within and outside the Company, are the most relevant aspects of the concept of "Quality".

1.1.3 Purpose of the manual

This manual has been written by Manufacturer in order to supply necessary information to all authorised operators carrying out maintenance of the Fresia vehicle Model F90 STI.

Specific information and maintenance recommendations, which are reported on this manual, are based on the knowledge at the time of printing.

FRESIA S.p.A. reserves the right to modify this manual at any time and without being obliged to communicate. Should you find any difference between your equipment and the information reported in this manual, you are kindly requested to contact Fresia S.p.A.

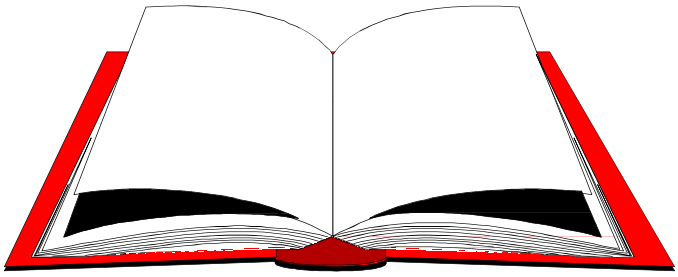
Should you find in this manual more information than the ones needed by the effective version of the equipment, these wouldn't affect either your reading or the effective maintenance to be carried out.

We recommend to read this manual carefully, before starting operations.

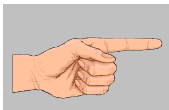
1.2 WHEN IS THE USE OF THE MANUAL SUGGESTED?

The use of the manual is recommended before these operations:

- First start
- Use of vehicle (work or transfer)
- Maintenance, cleaning, adjustments and calibrations
- Repair, parts and supplies ordering, technical assistance
- Demolition



READ THE USE AND MAINTENANCE MANUAL BEFORE OPERATE WITH THE VEHICLE



NOTE:
This manual must remain with the VEHICLE for its whole life.
Put it accessible at all the people acting on vehicle.

1.3 MEANING OF THE SYMBOLS FOR INSTRUCTIONS

This manual uses several symbols to draw the reader's attention and highlight some particularly important aspects of the discussion.

The following table lists and describes the meaning of the different symbols used.

SYMBOL	MEANING	EXPLANATION, ADVICE, NOTES
	***Danger***	*This symbol indicates a hazard encountered by personnel that may cause injury and even death.*
	***Warning***	*This symbol indicates a hazard that results in some serious damage to the vehicle.*
	***Note***	*This symbol indicates a hazard or unsafe procedure that can result in minor injury or damage to things.*
	***Note***	*LUBRICATION is required*

1.4 HOW IS THE MANUAL STRUCTURED?

Scrolling titles in the INDEX, you can go to the most important topics for easier consultation; in general, it is composed of:

CHAPTER 1 - INTRODUCTION
Contains the general information and the vehicle identification.

CHAPTER 2 - SAFETY NORMS
Contains safety norms description.

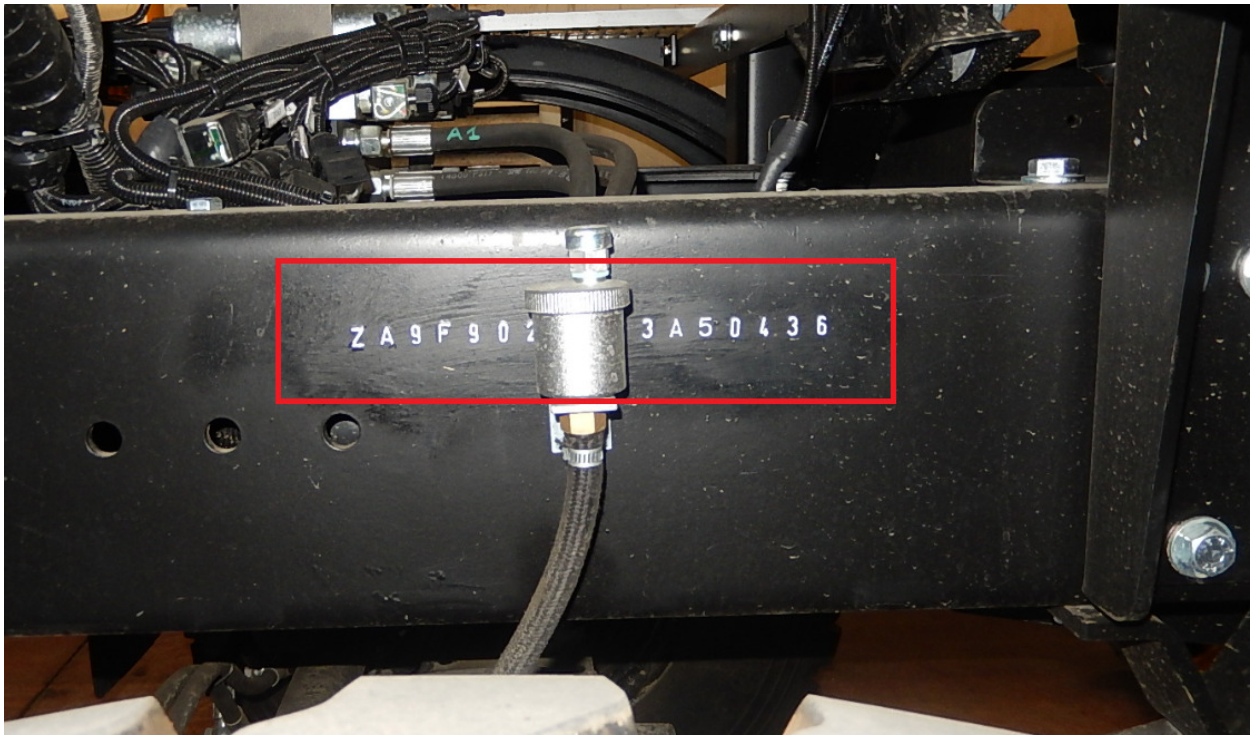
CHAPTER 3 – CAB AND INSTRUMENTATION
Contains the description of the cab and its instrumentation.

CHAPTER 4 - INSTRUCTION FOR THE USE
Contains information for the use of the vehicle with the description of the commands available to the operator and the most important operating procedures.

CHAPTER 5 - MAINTENANCE
Contains the schedule of preventive maintenance and operations organized in tabs, as well as major corrective maintenance operation.

1.5 VEHICLE IDENTIFICATION

The chassis number is printed on the front right side member of the frame.



1.6 MANUFACTURER ADDRESS

For any kind of information about the use, maintenance, installation etc. ***FRESIA S.p.A***. is always available to answer the Purchaser's requests.

The Purchaser is requested to ask the questions in a clear way, by referring to this catalogue and always indicating the data reported on the identification plate of the machine.

Any request about service assistance at the customer or clarification regarding the technical aspects of this document should be addressed to:

FRESIA S.p.A. Heavy duty equipment
Via Trento e Trieste, 30 - 17017 MILLESIMO (SV) - ITALY
TEL +39 019 5600005
FAX +39 019 5600009
www.fresia.it
service@fresia.it

1.7 INSTRUCTION FOR SPARE PARTS ORDER

Over time, some parts the vehicle are subject to wear or damages and need to be replaced. The Purchaser may ordinate the parts which have to be replaced. The customer is obliged to buy original spare parts.

The intervention of the Technical Assistance Center FRESIA Spa is recommended. Qualified operators are available, providing suitable tools, equipment and original spare parts.

The requests of the spare parts for the machine must be addressed to:

FRESIA S.p.A. Heavy duty equipment
Via Trento e Trieste, 30 - 17017 MILLESIMO (SV) - ITALY
TEL +39 019 5600005
FAX +39 019 5600009
www.fresia.it
spareparts@fresia.it

specifying the model and serial number of the machine to which the replacement refers.

1.8 WARRANTY

In the construction of the vehicle F90 STI, the manufacturer has employed the type and quality of materials held at its sole discretion to be appropriate to the machine.

The manufacturer guarantees the line free from defects in material or workmanship for a period indicated into the agreement.

During this period, the manufacturer will repair or replace free of charge, in time, those parts that are flawed and / or defective at long as they were not recognizable on the basis of careful consideration at the time of testing or commissioning and provided the Customer gives notice of such defects and / or defects to the Manufacturer, in by registered mail, within eight days of discovery.

It remains excluded any further obligation and / or compensation from the manufacturer.

This guarantee applies only to Customer in compliance with the provisions of the contract and exclusively in the event that the installation and use of the machine are carried out in accordance with the instructions in the user's manual.

The warranty excludes any and all liability for direct and indirect damage to persons and property resulting from improper use or maintenance of the machine.

They are also excluded from the guarantee that all parties for their use are subject to wear.

If the defects and / or failures defects are not covered by warranty: transport costs, inspection, removal and replacement, due to the intervention of a technician must be beard by the customer.

They are finally excluded from the guarantee and therefore will be charged to customer defects arising out for one or more of the following reasons:

- Improper use or abuse by the operator;
- Incorrect: installation, commissioning, operation and maintenance;
- Use of the machine with safety devices or visibly defective.
- Safety devices and protective assembled incorrectly or damaged.
- Failure in following instructions and warnings contained in the user's manual.
- Repairs carried out improperly;
- Accidents caused by foreign objects, negligence, overloading or acts of God.

SAFETY NORMS

Paragraph *Page*

2.1 GENERAL SAFETY NORMS

DANGER:

Read carefully ALL the following instructions before to operate on the vehicle!

1. Make sure the work area around the vehicle is safe being aware of the risk conditions that can come and create.

2. Always wear safety glasses and safety shoes when performing maintenance operations

3. **Do not** wear loose clothing or torn. Remove all the jewellery while working.

   Disconnect the battery before starting repair work. Put a label "Not Operational" on the control panel.

4. If the vehicle has been used to wait for them to cool the mechanical components, before working on them.

5. Do not work under anything that is supported only by the lifting pistons or by a hoist. Always use blocks or adequate supports to hold the piece.

6. Remove all the pressure from the hydraulic system and the cooling system before working on the pipes. Be careful while you detach a device from a system that uses pressure. Do not check for loss of pressure with the hands. The high pressure air, oil or fuel can cause personal injury.

7. To avoid personal injury, use a hoist or get help while lifting components weighing more than 23 kg. (50 lb.). Make sure that all lifting devices such as chains, hooks, or slings are in good condition and have the right skills. Check that the hooks are properly placed. Always use a tray extender when needed. Lifting hooks must not undergo lateral stresses.

8. The methyl ethyl ketone and naphtha (MEK) are flammable and should be used with care. Follow the manufacturer's instructions to provide a complete safety while using these materials.

DANGER:

KEEP OUT OF REACH OF CHILDREN.

9. To avoid burns, be careful when you touch the exhaust engine, the engine and mechanical units, note the hot liquids in the lines and hoses

10. Use only tools in good condition and know how to use before doing any service work. Use ONLY original spare parts.

    Always use fasteners of the same degree when making the exchange. Never use fasteners of inferior quality.

11. Never use gasoline or other flammable substances to clean the pieces, but always solvents duly approved.

12. Do not use the emergency starter (booster) to recharge the batteries and therefore always remove the batteries to the end use of the machine.

2.2 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) means all those devices worn by a worker for his protection from risks resulting from performed in the workplace. In order to perform maintenance activities and to ensure safety to personnel, maintenance personnel must wear as described hereinafter as well as clothing considered suitable for the type of work to be performed.

PPE		USE
Safety shoes		Safety shoes must be insulated, reinforced toe and must be worn to perform work involving parts excited by currents, falling loads and penetration of hazardous liquids. **In case of misuse, workers run the risk of crushing feet.**
Gloves		Gloves should be worn for all types of work, such as: ⇨ work with excited items ⇨ works with abrasive materials or high temperatures ⇨ work with sharp details **Wear gloves is mandatory in case of risk of shearing**
Protective helmet		To perform work, which entails risks to the head, particularly during assembly and disassembly, handling of machine components or heavy elements using a crane or other lifting tools. In case of misuse, workers run the risk of head injuries.

CAB AND EQUIPMENT OF CONTROL

Paragraph *Page*

3.1 KEYS

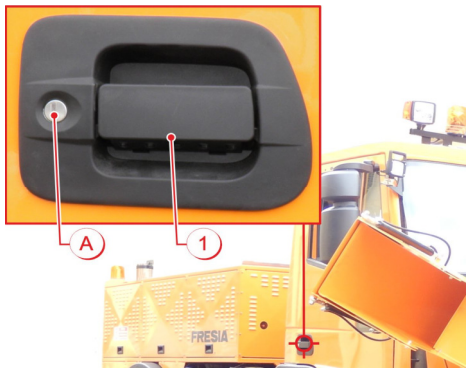
Following keys are supplied with the vehicle:

1. Key for ignition and doors opening
2. Key for fuel tank
3. Key for lateral doors

3.2 CAB ACCESS

From outside

The doors of the cab are lockable. To open insert the key in the lock **A** and rotate it counterclockwise, then pull the handle **1**.



From inside

To open the door from the inside pull back and push the lever 2.

(Opening the door, the lights of the cabin will light on. Closing the doors, the lights turn off, anyhow they have a timer).

DANGER::
The handle has not to be used for support in getting on and off.

To close insert the key in A and rotate clockwise

NOTE:
The lock should be periodically lubricated.

The access to the cabin is facilitated by the grab handles to the sides

DANGER:
Keep the steps and the platforms clean from snow to prevent slipping.
Grab the handles to go up.

3.3 SEATS

The seats have both mechanical suspension.

- (A) – Forward/Backward sliding
- (B) – Weight setting
- (C) – Back tilting

DANGER:

The adjustment must be performed with stationary vehicle

3.4 STEERING WHEEL SETTING

To adjust the height and the angle of the steering wheel:

1. Lift the lever to loose the set screw (red arrow).

2. Move the steering wheel to the desired position (forward, backward, up, down).

3. Move the lever to its original position to lock the steering wheel.

DANGER:

The adjustment must be performed with stationary vehicle

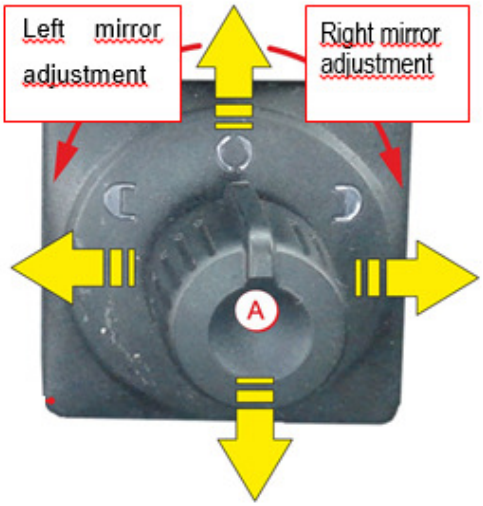
DANGER:

At the end of the adjustment, ensure that the steering wheel is locked.

3.5 REAR VIEW MIRRORS

The rearview mirrors are adjustable by the command 25 in the cabin, the upper mirror by hand.

The mirrors are heated electrically with the switch "13".



Turn the ring to left or right, depending on you want to adjust the mirror left or right, then, move it in order to have the best visibility. The possible movements are high, low, left and right as indicated by the arrows.

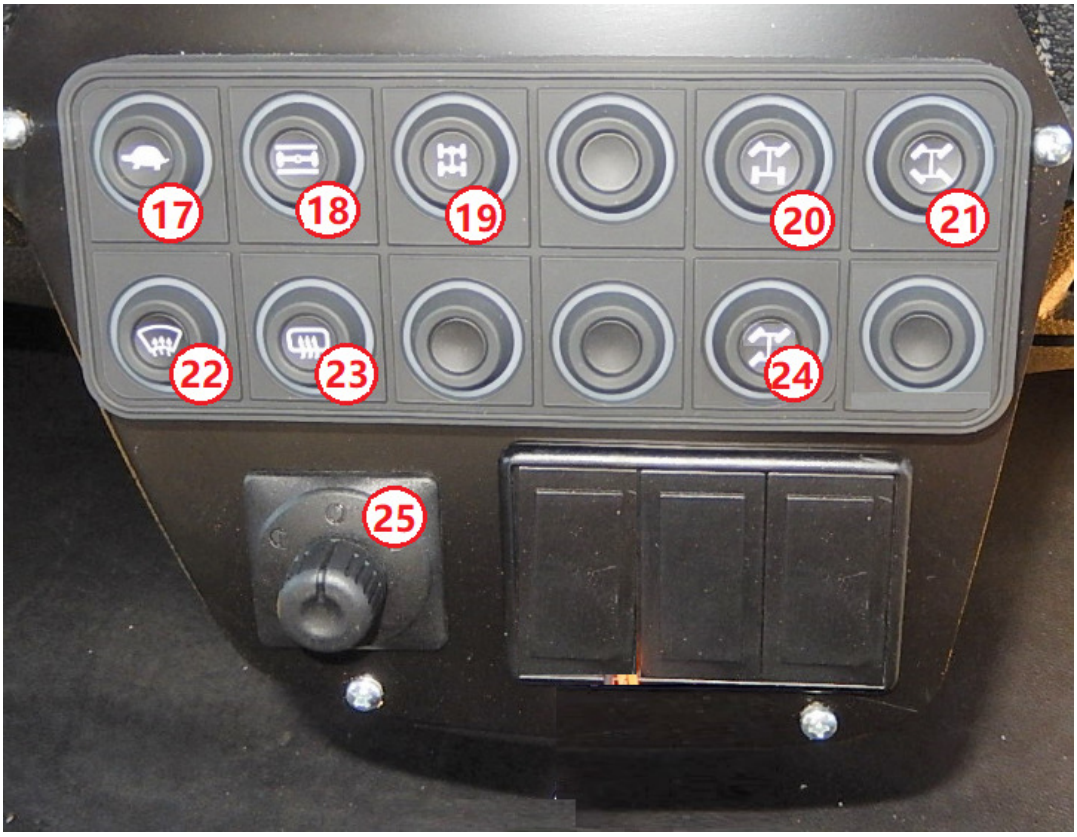
DANGER:

The adjustment of the rearview mirrors must be done with the stationary vehicle.

3.6 CONTROLS OF VEHICLE

REF.	DESCRIPTION
1.	Main monitor
2.	Emergency push button
3.	Vehicle lights switch
4.	Emergency lights switch
5.	Parking brake switch
6.	Front working light switch
7.	Rear working light switch

REF.	DESCRIPTION
8.	Left sliding window push button
9.	Rotary beacon switch
10.	Right sliding window push button
11.	Cab light switch
12.	Fog light switch
13.	Rear mirrors heating switch
14.	Rear fog lights
15.	Batteries disconnection switch
16.	Heating control

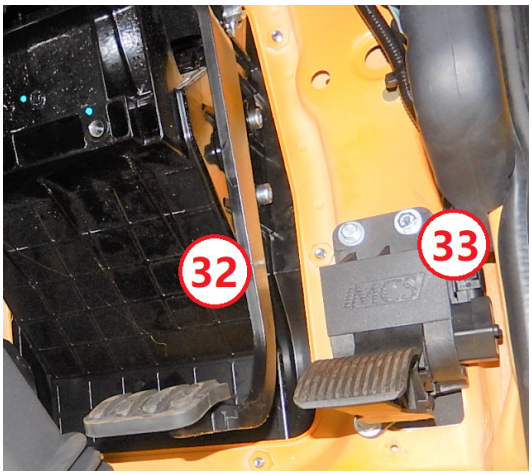


REF.	DESCRIPTION
17.	Low speed switch
18.	Rear traction switch
19.	Differential locking switch
20.	Front steering switch
21.	4 wheel steering concentric switch
22.	Windshield heating switch

REF.	DESCRIPTION
23.	Rear window heating switch
24.	4 wheel steering (crab) push button
25.	Rearview mirrors adjustment

REF.	DESCRIPTION
26.	Blowerhead control Joystick
27.	Direction control lever

REF.	DESCRIPTION
28.	Vehicle lights control lever
29.	Turning lights and horn control lever
30.	Windshield wiper
31.	Ignition panel
32.	Brake pedal
33.	Trottle pedal
34.	Supplementary heater EBERSPÄCHER



3.6.1 Main monitor

To use the functions see the following instructions in **paragraph 3.7.**

3.6.2 Emergency push button

Press the red button to stop the engine in an emergency.

After the button is pushed down, it is necessary to move it in the original position to restart the vehicle.

WARNING:

Use only in case of EMERGENCY!

3.6.3 Vehicle lights switch

Press the icon, to turn on the vehicle lights.
Press the upper part of the switch to turn off.

3.6.4 Emergency lights switch

Press the icon, to turn on the emergency lights.
Press the upper part of the switch to turn off.

3.6.5 Parking brake switch

For the disengagement of the parking brake the switch must be unlocked, moving the lever A downward and be pressed on the symbol.

To insert the parking brake, press the top of the switch.

3.6.6 Front working light switch

Press the icon, to turn on the front working lights.
Press the upper part of the switch to turn off.

3.6.7 Rear working light switch

Press the icon, to turn on the rear working lights.
Press the upper part of the switch to turn off.

3.6.8 Left sliding window push button

Keep pressed the button on the symbol, to raise the left window..
Keep pressed the bottom of the button to low it.

3.6.9 Rotary beacon switch

Press the symbol to activate the rotary beacon
Press the bottom of the switch to turn off.

3.6.10 Right sliding window push button

Keep pressed the button on the symbol, to raise the right window.
Keep pressed the bottom of the button to low it.

3.6.11 Cab light switch

Press the symbol to turn on the cab light.
Press the bottom to turn off.

3.6.12 Fog lights switch

Press the symbol to turn on the fog lights.
Press the bottom to turn off.

3.6.13 Rear mirrors heating switch

Press the symbol to turn on the rear mirrors heating.
Press the bottom to turn off.

3.6.14 Rear fog light switch

Press the symbol to turn on the rear fog lights.
Press the bottom to turn off.

3.6.15 Batteries disconnection switch

Slow down the safety and press the button on the lower part (batteries are connected when the switch is aligned with the others)

To disconnect the batteries: lower the safety to unlock and push the button on the upper part.

WARNING:

Do not use this switch to normally shut down the engine. Serious damages at the engine control units can result.

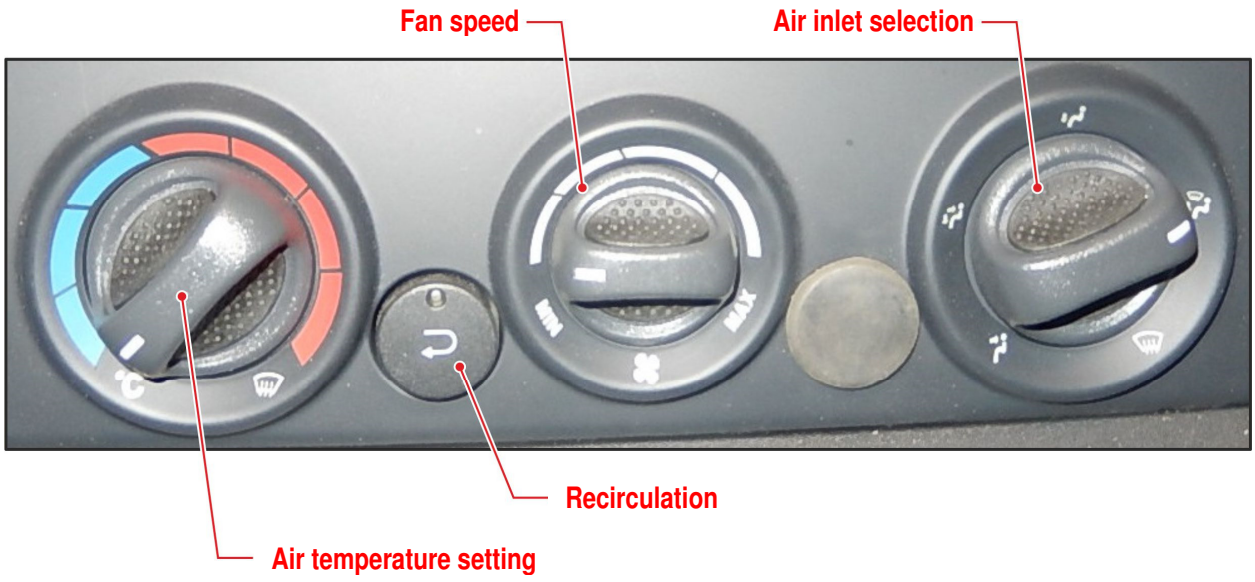
WARNING:

Activate it after at least 3 minutes after having turned off the engine to allow the engine control unit to make any checks required for shutdown.

WARNING:

Disconnect the batteries when the vehicle is not used.

3.6.16 Heating control



3.6.17 Low speed push button

This button is active when the outer ring is illuminated in red. When pressed, it changes the state from inactive to active and vice versa.

Keep pressed the switch for at least 3 seconds for the command to be accepted.

NOTE:
It is possible to insert the command only with direction lever in neutral.

WARNING:
Insert the low speed only with stationary vehicle and direction lever in neutral.

3.6.18 Rear traction locking push button

This button is active when the outer ring is illuminated in red. When pressed, it changes the state from inactive to active and vice versa.

Keep pressed the switch for at least 3 seconds for the command to be accepted.

NOTE:
It is possible to insert the command only with direction lever in neutral.

WARNING:
The rear traction locking must be only used during the working operations and not for transport.

WARNING:
Insert the rear traction only with stationary vehicle and direction lever in neutral.

3.6.19 Differential locking switch

This button is active when the outer ring is illuminated in red.
When pressed, it changes the status from inactive to active and viceversa.
Keep pressed the switch for at least 3 seconds for the command to be accepted.

NOTE:
It is possible to insert the command only with direction lever in neutral.

WARNING:
Differential locking connection and disconnection must be only done with stationary vehicle and direction lever in neutral.

3.6.20 Front steering push button

This button is active when the outer ring is illuminate in green.

Keep the switch pressed to select the front steering mode until the light around illuminates and the indicator  on main monitor is ON.

If the alignment procedure is not ended, a warning light  ***is on. Keep pressed the switch for more time***

NOTE:It is possible to insert the command only with the direction lever in neutral.

NOTE: The command automatically aligns the wheels before the selection of the steering mode.

3.6.21 4 wheel steering concentric push button

This button is active when the outer ring is illuminated in green.

Keep the switch pressed to select the four-wheel steering mode until the light around illuminates and indicator  on the main monitor is ON.

If the alignment procedure is not ended, a warning light  is on. Keep pressed the switch for more time

NOTE:
It is possible to insert the command only with direction lever in neutral.

NOTE:
The command automatically aligns the wheels before the selection of the steering mode.

3.6.22 Windshield and lateral glass heating push button (OPTIONAL)

This button is active when the outer ring is illuminate in orange. When pressed, it changes state from inactive to active and vice versa.

The heating of the windshield is a time and automatically disconnects after 5 minutes.

3.6.23 Rear window heating push button (OPTIONAL)

This button is active when the outer ring is illuminated in orange. When pressed, it changes state from inactive to active and vice versa.

The rear window heating is timed and automatically disconnects after 2 minutes.

3.6.24 4 wheel steering crab push button

This button is active when the outer ring is illuminated green.

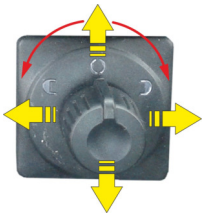
Keep the switch pressed to select the front steering mode until the light around illuminates and the indicator  on the main monitor is ON.

If the alignment procedure is not ended, a warning light  is on. Keep pressed the switch for more time

NOTE:
It is possible to insert the command only with direction lever in neutral.

NOTE:
The command automatically aligns the wheels before the selection of the steering mode.

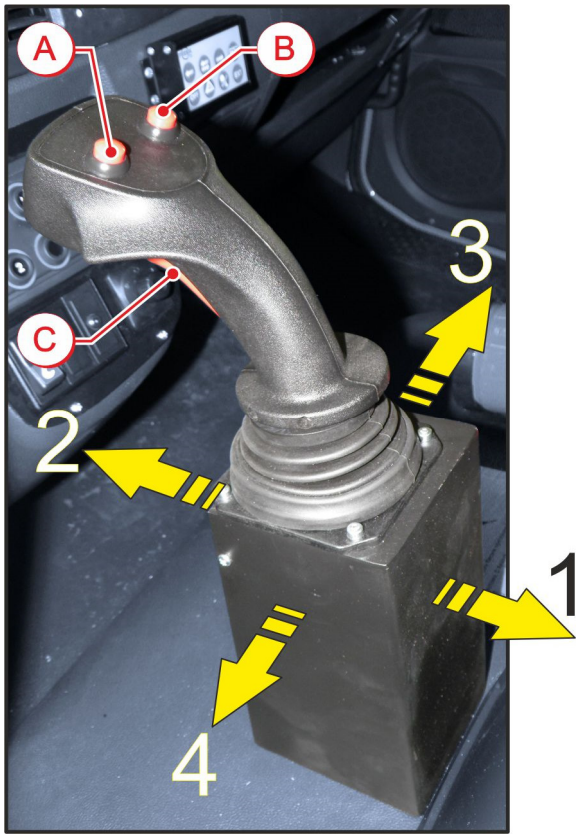
3.6.25 Mirrors adjustment device



Turn the knob to the left or to the right, depending on what mirror had to be adjusted. Then move it to position the mirror in order to have the best visibility.

The movements are possible to the top, bottom, left and right.

3.6.26 Blower head control Joystick



NOTE:
In WORK modality, all the movements are activated, as well in transfer with direction lever in neutral.

NOTE:
With the vehicle in motion and in TRANSFER MODE. It results impossible to low the blowerhead in floating.

The command is provided of the safety "**dead men**".

Therefore, it is always necessary to press the front button "**C**" to operate.

BUTTON "C" PRESSED:

1. BLOWER HEAD LIFTING UP
2. BLOWER HEAD LOWERING

3. 2ND STAGE CONVEYOR RIGHT ROTATION
4. 2ND STAGE CONVEYOR LEFT ROTATION

FLOATING: Keep the lever in forward for at least 3 seconds with button C pressed.

BUTTONS "C" + "A" PRESSED:

1. BLOWERHEAD TILTING BACKWARD
2. BLOWERHEAD TILTING FORWARD
3. BLOWERHEAD RIGHT ROTATION
4. BLOERHEAD LEFT ROTATION

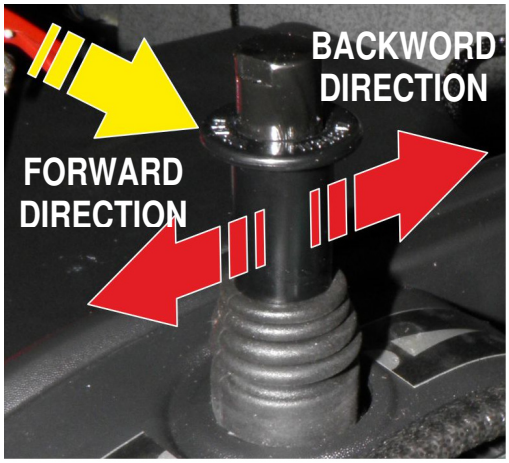
BUTTONS "C" + "B" PRESSEND:

1. CHUTE COVER OPENING
2. CHUTE COVER CLOSING
3. CHUTE RIGHT ROTATION
4. CHUTE LEFT ROTATION

3.6.27 Direction control lever

The lever allows the direction selection.

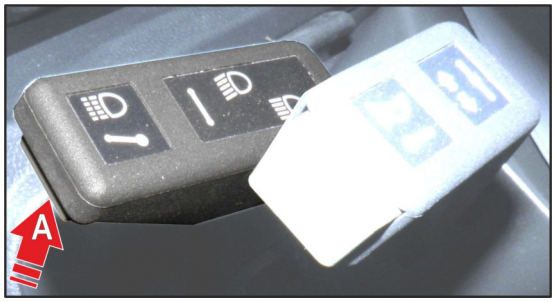
Lift up the ring in the upper part, to be able to move it forward or backward.



NOTE:
After moving the lever backward, the system lifts up the blowerhead automatically and it takes 6 seconds to engage the reverse.

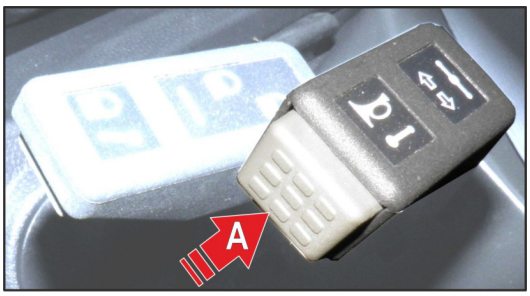
WARNING:
It is not possible to select the direction if the parking brake is engaged.

3.6.28 Vehicle lights control lever



- ✓ Grey button **A** under the lever = lightning
- ✓ Forward = low beam headlights
- ✓ Backward = high beams headlights

3.6.29 Turning lights and horn control lever



Direction indicators:

- ✓ Forward = turning right
- ✓ Backword = turning left

Push the button **A** to activate the horn.

3.6.30 Windshield wiper and engine speed control lever

Windshield wiper is activatable moving the lever backward, three speeds can be selected:

- ✓ O = off
- ✓ -------- = intetermittance
- ✓ ——— = 1ª speed
- ✓ ═══ = 2ª speed

Button under the lever = water splash on windshield.

3.6.31 Ignition panel

Insert the key.

Turn the key clockwise to the first position to turn on the instrument panel.

Rotate the second click to start the engine

WARNING:

Once it is rotate it is not possible to extract the key.

3.6.32 Brake pedal

3.6.33 Trottle pedal

3.6.34 Supplementary heating EBERSPACHER

A. Settable heating modality
B. Heating turn off
C. Continuous modality
D. Red indicator of system active
E. Continuous modality indicator (blue)
F.Temperature setting

The heater can be set in mode:

a) Continuous modality

b) Controlled temeperature modality.

Operation at controlled temperature

Activation:

1. Press the **A** button, the red LED **D** should light up simultaneously, it indicates that the heating controlled mode is activated;
2. Turn the knob **F** to set the temperature (max is 34 °C, min is 6 °C).

Continuous modality

Activation:Press the button **C**, the blue LED **E** should light on, it indicates the activation of the continuous modality.

Turn off

Push down the button **B**: The shutdown is not immediate as the heating system first performs the complete switch-off operation of a kind suitable to decrease its internal temperature.

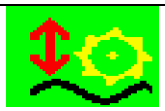
WARNING:
If the supplementary heating has been used, wait at least 4 minutes from its turn off before disconnecting the batteries.

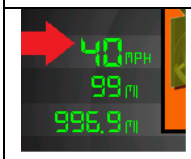
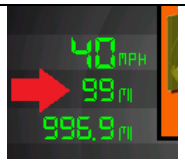
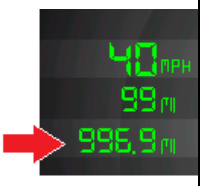
3.7. MAIN MONITOR, CONTROLS AND FUNCTION SHEETS

At the ignition the monitor shows the following **MAIN SHEET in TRANSPORT** mode:

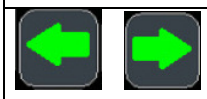
During the snow removal operation the vehicle must be in WORK modality, **MAIN SHEET in WORK**:

3.7.1 MAIN SHEET INDICATORS

	**(1) Transport modality ON** This condition is present at the ignition of the engine. To use for transferring.
	**(2) WORK modality ON** After pressing button F2 to pass from Transport to Work Work modality has to be used during the snow removal operation.
	**(3) Blower head 1st speed selected** By the button F3, only in WORK modality
	**(4) Blower head 2nd speed selected** By the button F4, only in WORK modality
	**Blower rotation stop**
	**Automatic mode inserted**
	The symbol illuminates when **FLOATING** is inserted

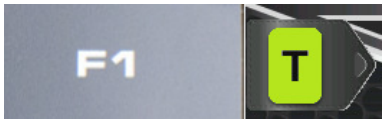
	**Fuel level gauge with warning light** *When the level is too low, the last sign becomes red*  *. Fill the tank!*
	**Engine water temperature gauge with warning light** *When the temperature is at the maximum, the higher sign becomes red! Stop the vehicle and check immediately for the cause.* 
	F – Vehicle ready to move in forward N – Vehicle in Neutral R (flashing yellow) – even if reverse is selected by the direction control lever, the vehicle does not move because the system need some seconds to lift the equipment automatically. R (fixed yellow) – Vehicle has lifted equipment and can move in backward
	**Vehicle speed indicator**
	**Partial distance**
	**Total distance**
	**Parking brake engaged**
	**Batteries charge indicator** (when charge is low the icon  becomes red)
	**Engine oil pressure** *If red warning lights on, stop immediately the vehicle and check for the cause.* 

	**Working hours indicator**
	**Hydraulic oil level indicator** (when level is low the icon  becomes red)
	**Brakes system pressure indicator** (when pressure is low the icon  becomes red)
	Front wheel steering engaged indicator  indicates that the process is not completed. Keep pressed the steering change switch for more time  indicates a failure in the wheel alignment
	**Coordinated steering engages indicator**  indicates that the process is not completed. Keep pressed the steering change switch for more time  indicates a failure in the wheel alignment
	**Rear wheel steering engaged indicator (optional)**  indicates that the process is not completed. Keep pressed the steering change switch for more time  indicates a failure in the wheel alignment
	**Crab wheel steering engaged indicator (optional)**  indicates that the process is not completed. Keep pressed the steering change switch for more time  indicates a failure in the wheel alignment
	**Rear fog light engaged indicator**
	**Rotary beacon engaged indicator**
	**Water into the fuel filter warning light**  *Spurge water from the pre-filter*
	**Fuel filter pre-heating phase indicator**
	**Pre-heating phase indicator**
	**Engine cooling liquid level**

	If red warning lights on, stop immediately the vehicle and check for the causes
	**Air filter obstructed indicator.** *Clean or replace the cartridges*
	**Sensores failure** In the page of failures the indication of the damaged sensor
	**Left and right turning lights indicator**
	**Low beam headlights indicator**
	**High beam headlights indicator**
	**Low speed engaged indicator**
	**Rear traction indicator**
	**Differential locking indicator**
	**Engine speed indicator**
	**Outside temperature**
	**Engine failure indicator (press**  **and F1 to get the error code)**  *If the light is on, stop immediately the vehicle and check for the causes*
	**Engine failure indicator (press**  **and F1 to get the error code)**  *If the light is on, stop immediately the vehicle and check for the cause*
	**Hydrostatic traction failure (press**  **and F2 to get the error code)**  *If the light is on, stop immediately the vehicle and check for the cause*
	**CAN BUS failure indicator (press**  **and F3)**  *If the light is on, stop immediately the vehicle and check for the cause*

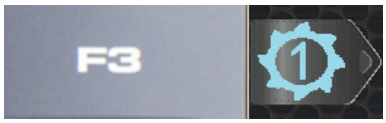
	Not active
	Not active
	Not active
	Not active

3.7.2 MAIN SHEET COMMANDS* (RELATIVE BUTTON MUST BE KEPT PRESSED FOR AT LEAST 3 SECONDS):



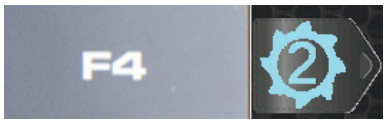
TRANSPORT →

WORK →



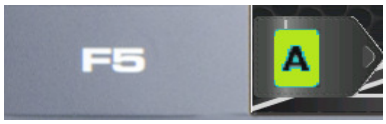
BLOWERS ROTATION 1ST SPEED →

(only in WORK modality)



BOWERS ROTATION 2ND SPEED →

(only in WORK modality)



AUTO MODE (OPTIONAL) →

the command needs: rollers rotation inserted, forward direction, engine at 1600 rpm

ENGINE CONTROL (ONLY IN WORK MODALITY)

When WORK is selected, it is possible to command the engine by buttons on monitor

F6 – OFF - ENGINE AT MINIMUM (engine at 950 rpm)

F7 – MAX (engine at 1800 rpm)

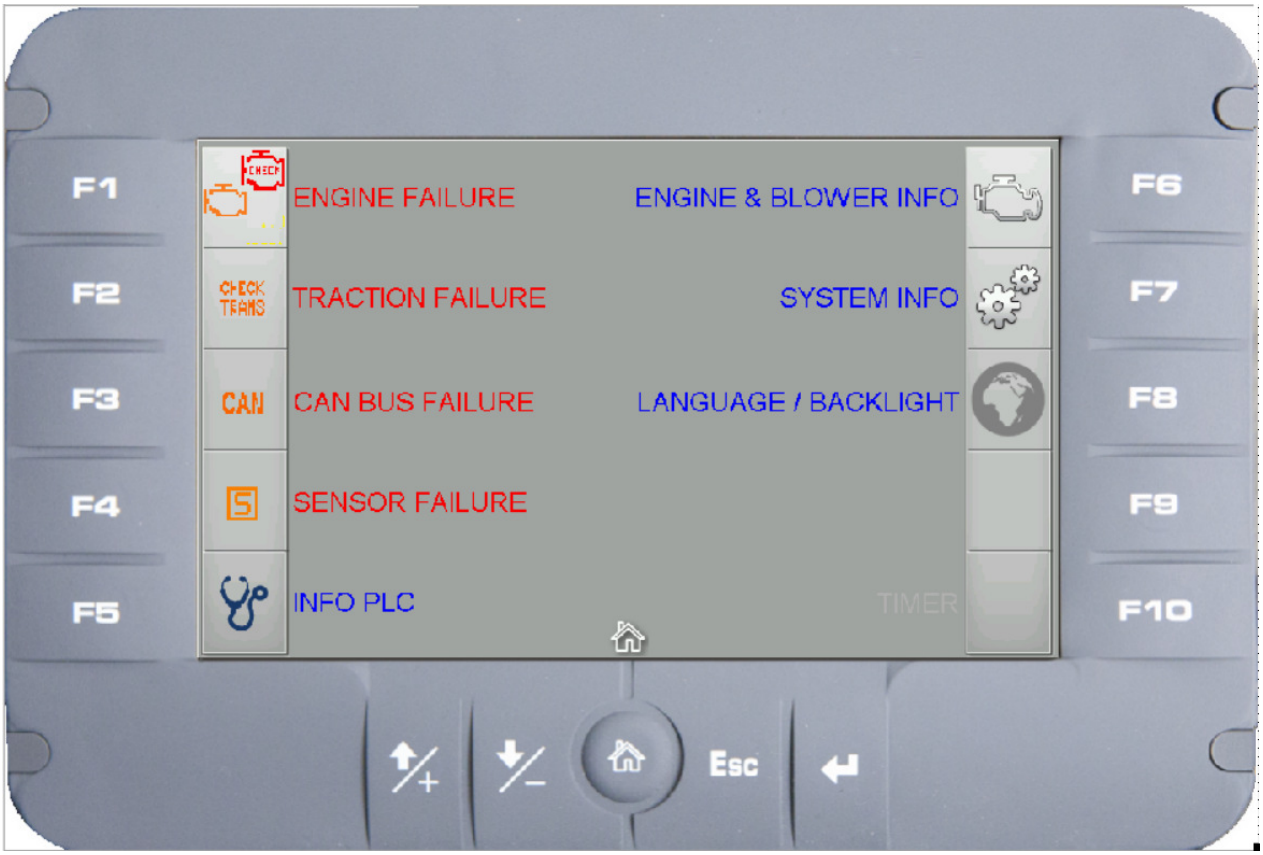
F8 - SET+ (ENGINE SPEED INCREMENT) upper bound 2050 rpm

F9 – SET- (ENGINE SPEED DECREMENT) lower bound 950 rpm

*When these functions are selected, they appear the icon of the table above.

FUNCTON SHEETS

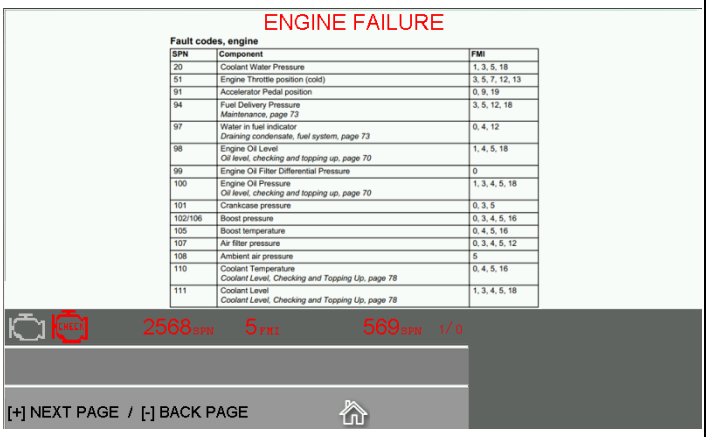
Press the button  to access the MAIN FUNCTION SHEET

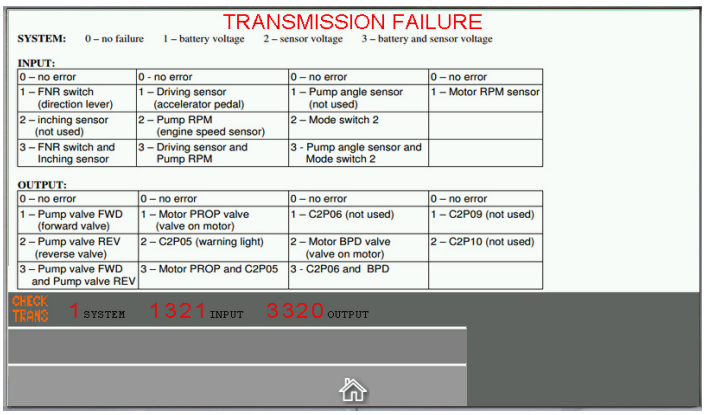


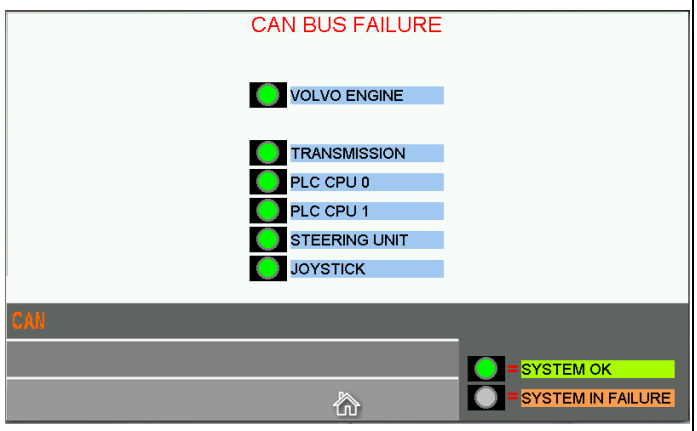
From this main sheet it is possible to visit following sections (by pressing):

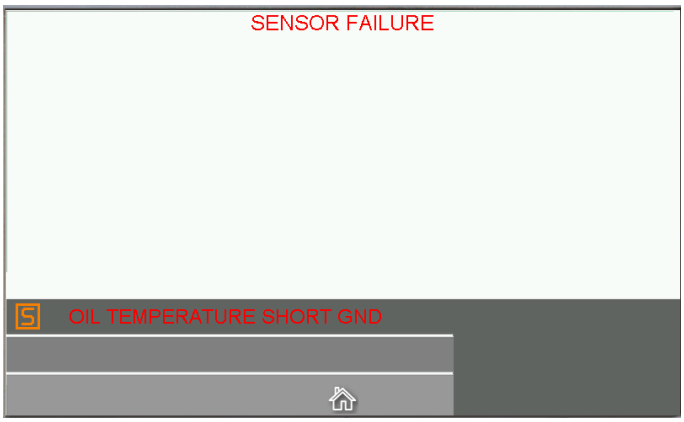
✓ **F1 F2 F3 F4** to access the failure pages

NOTE: Engine and Hydrostatic Transmission codes are reported at the endo of chapter 5

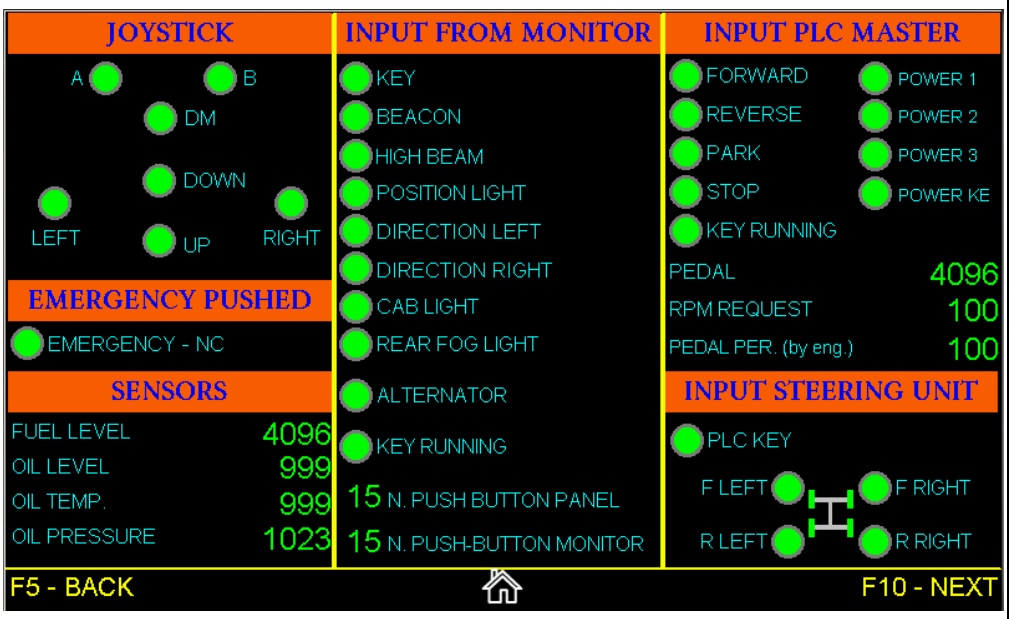

ENGINE FAILURE
Fault codes, engine
SPN Component FMI
20 Coolant Water Pressure 1, 3, 5, 18
51 Engine Throttle position (cold) 3, 5, 7, 12, 13
91 Accelerator Pedal position 0, 9, 19
94 Fuel Delivery Pressure 3, 5, 12, 18
Maintenance, page 73
97 Water in fuel indicator 0, 4, 12
Draining condensate, fuel system, page 73
98 Engine Oil Level 1, 4, 5, 18
Oil level, checking and topping up, page 70
99 Engine Oil Filter Differential Pressure 0
100 Engine Oil Pressure 1, 3, 4, 5, 18
Oil level, checking and topping up, page 70
101 Crankcase pressure 0, 3, 5
102/106 Boost pressure 0, 3, 4, 5, 16
105 Boost temperature 0, 4, 5, 16
107 Air filter pressure 0, 3, 4, 5, 12
108 Ambient air pressure 5
110 Coolant Temperature 0, 4, 5, 16
Coolant Level, Checking and Topping Up, page 78
111 Coolant Level 1, 3, 4, 5, 18
Coolant Level, Checking and Topping Up, page 78
2568 SPN 5 FMI 569 SPN 1 / 0
[+] NEXT PAGE / [-] BACK PAGE


TRANSMISSION FAILURE
SYSTEM: 0 – no failure 1 – battery voltage 2 – sensor voltage 3 – battery and sensor voltage
INPUT:
0 – no error | 0 - no error | 0 – no error | 0 – no error
1 – FNR switch (direction lever) | 1 – Driving sensor (accelerator pedal) | 1 – Pump angle sensor (not used) | 1 – Motor RPM sensor
2 – inching sensor (not used) | 2 – Pump RPM (engine speed sensor) | 2 – Mode switch 2 |
3 – FNR switch and Inching sensor | 3 – Driving sensor and Pump RPM | 3 - Pump angle sensor and Mode switch 2 |
OUTPUT:
0 – no error | 0 – no error | 0 – no error | 0 – no error
1 – Pump valve FWD (forward valve) | 1 – Motor PROP valve (valve on motor) | 1 – C2P06 (not used) | 1 – C2P09 (not used)
2 – Pump valve REV (reverse valve) | 2 – C2P05 (warning light) | 2 – Motor BPD valve (valve on motor) | 2 – C2P10 (not used)
3 – Pump valve FWD and Pump valve REV | 3 – Motor PROP and C2P05 | 3 - C2P06 and BPD |
CHECK TRANS 1 SYSTEM 1321 INPUT 3320 OUTPUT

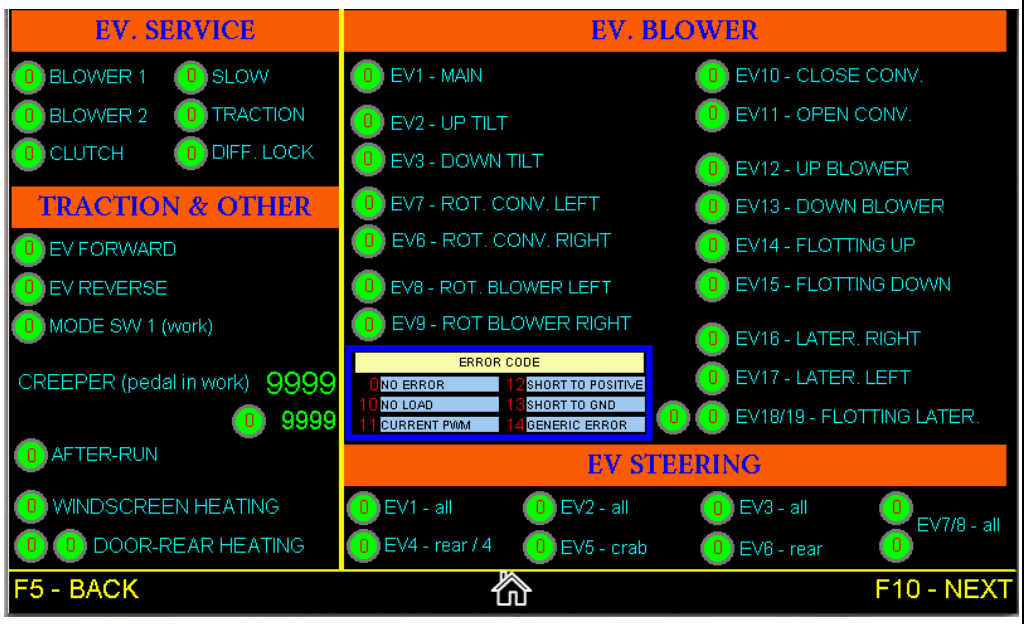

CAN BUS FAILURE
VOLVO ENGINE
TRANSMISSION
PLC CPU 0
PLC CPU 1
STEERING UNIT
JOYSTICK
CAN
=SYSTEM OK
=SYSTEM IN FAILURE


SENSOR FAILURE
OIL TEMPERATURE SHORT GND

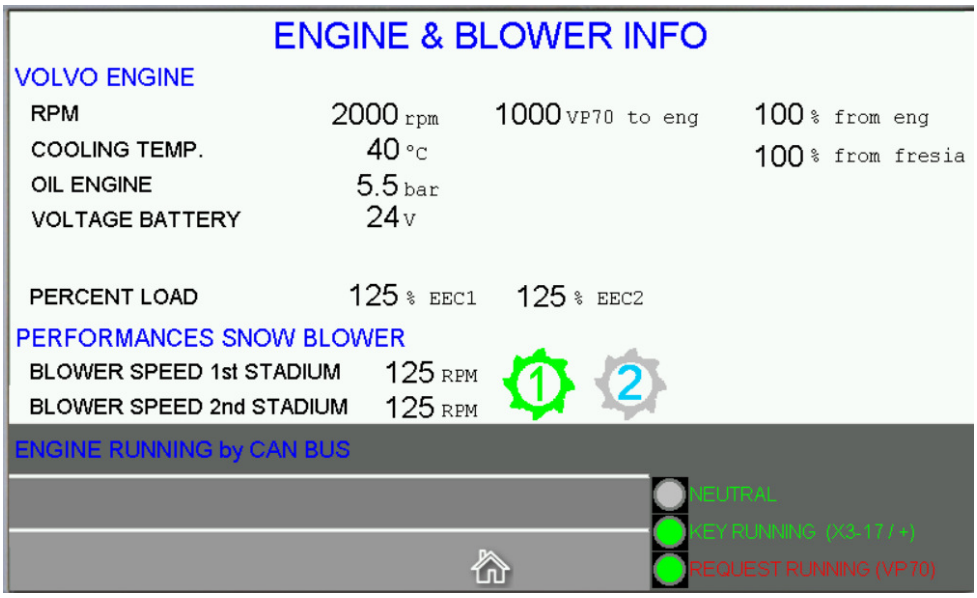
✓ Press **F5** to check the input state



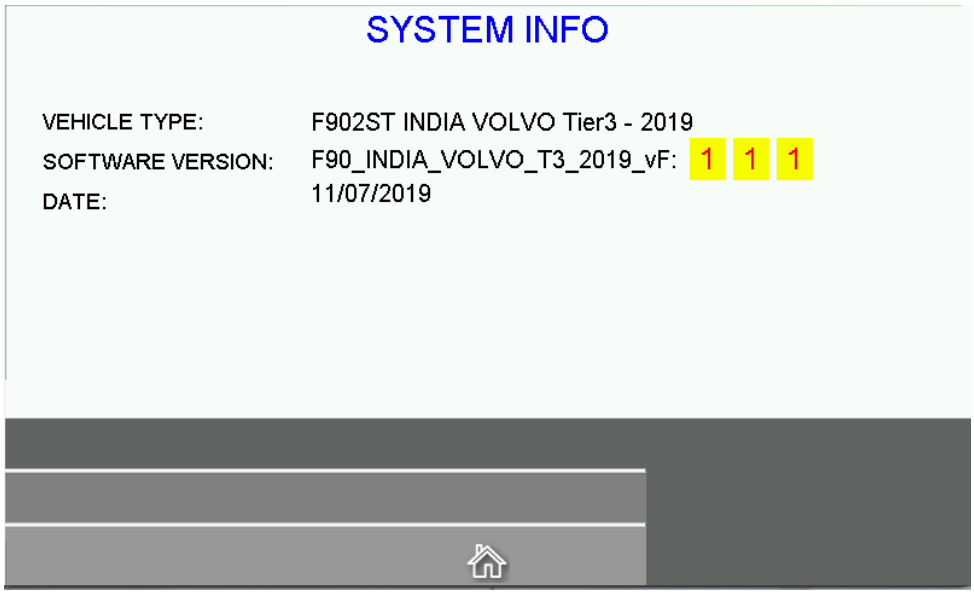
Press **F10** to check the output state



✓ Press **F6** to access the engine and blowerhead info



✓ Press **F7** to access the system info



✓ Press **F8** to access the system info

F1-F2-F3-F4 Monitor language selection and **F6-F7** monitor bright increment/decrement

Press  to return to main function sheet

Press again to return to the main sheet

INSTRUCTION FOR THE USE

Paragraph *Page*

4.1 GENERAL INFORMATION

A proper care of your vehicle will result in a longer life, better performances, and a more economical operations of it.

- ✓ Perform daily maintenance checks that are listed in the MAINTENANCE SHEETS of CHAPTER 5.
- ✓ Before using the vehicle, check the pressure indicators, the temperature indicators, the alarm lights, and the other gauges to make sure that they are operational.
- ✓ When the vehicle is not operating, disconnect the batteries. Supplementary devices (when present) can consume power even when the car is stationary.

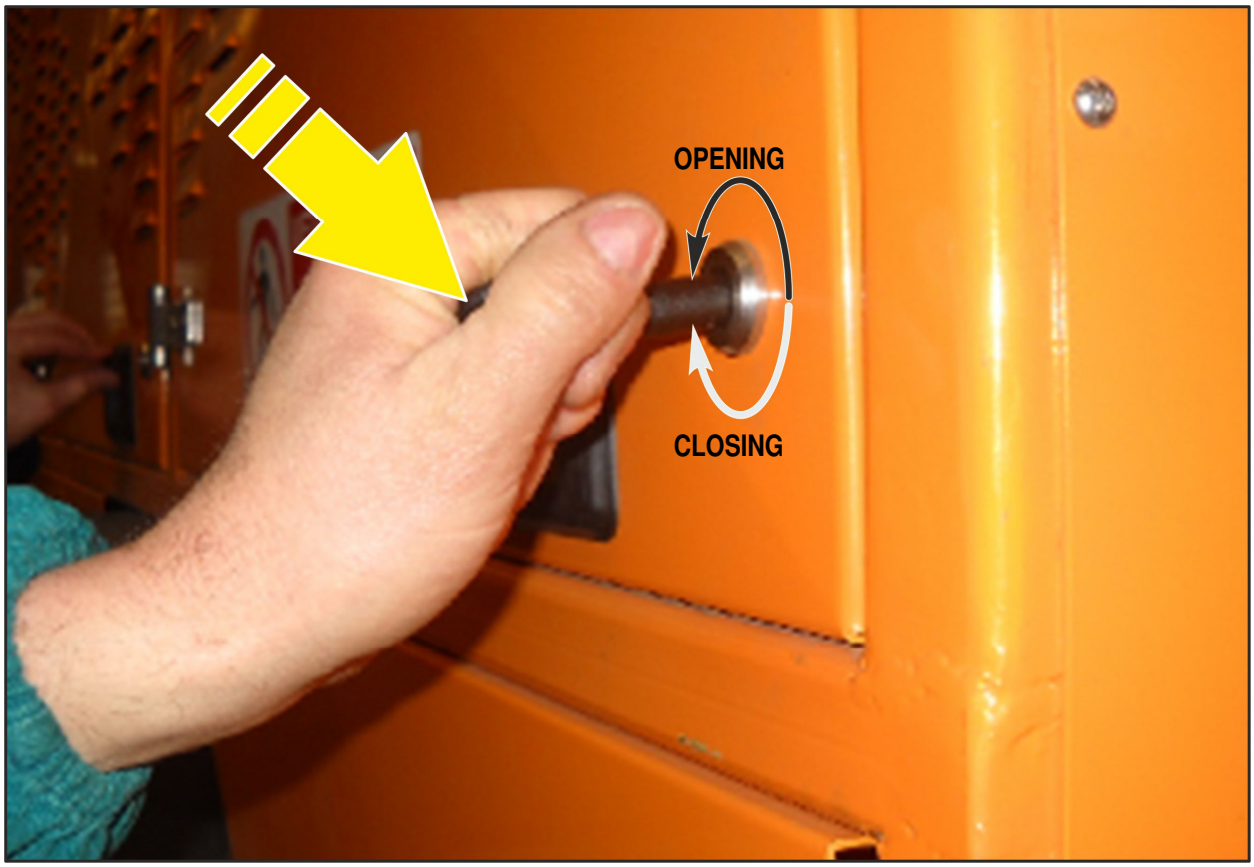
DANGER:

DON'T OPERATE ON A DIESEL ENGINE OR WHERE THE FUEL VAPORS CAN BE PRESENT

These fumes could be drawn into the air intake of the system and cause engine acceleration and a speed higher than normal, which can start a fire, an explosion or extensive damage to the vehicle.

4.2 REAR BODY DOORS OPENING / CLOSING

Right and left side of the vehicle are provided of door panel both, which can be opened by the provided key. Press lightly and rotate the key clockwise to open and anticlockwise to close.



N° 1 door is in the front part of the rear body, it is accessible from the step bracket behind the cab.

4.3 STARTING / SHUT DOWN OF THE ENGINE

4.3.1. Batteries connection

Slow down the safety and press the button on the lower part (batteries are connected when the switch is aligned with the others)

4.3.2. Starting procedure

WARNING:
Before starting the engine, make the checks BEFORE STARTING listed in chapter MAINTENANCE.

1. Put the direction **27** in neutral (see CHAPTER 3).
2. Make sure that the parking brake switch is engaged;

DANGER:
Make sure that no one is standing near of the vehicle.

3. Start the engine by the ignition key **31**(see CHAPTER 3).
4. After engine start, increase slowly the engine speed (RPM) to allow an adequate lubrication of the bearings and to allow the oil pressure to become stabilized.

MOVE THE VEHICLE

Once the engine is started:

5. Press the brake pedal and disengage the parking brake.
6. Move the direction lever in forward or backward to move the vehicle in forward or reverse. It is necessary to lift up the lever to move it. On cluster will light on the indicator F (forward) or R (reverse).

NOTE:
If selecting the reverse, the system lift the blowerhead automatically before moving. It takes some time.

7. Gradually accelerate.

4.3.3 Shut-down procedure

It is important to run the engine at idle for a time between 3 and 5 minutes, before shutting down it. It allows to decrease the temperature of the lubrication oil and of the cooling liquid.

NOTE:
Do not run the engine at idle for a long time.
If the vehicle is not used, shut down the engine.

To shut down the engine: release completely the throttle pedal and rotate the starting key in position **0** (see CHAPTER 3).

WARNING:
Disconnect the batteries when not using the vehicle.

4.4 RULES FOR TRANSFERRING

During the road circulation, the operator is asked to respect the following recommendations:

1. Use the vehicle exclusively in front steering;
2. Make sure that the blower head is raised and locked with the safety bars ("Procedure for installation of blower head safety bars ")
3. Use only lights placed on the blower head. Make sure that lights on the upper part of the cab are off.
4. Move the casting chute as to get the maximum view of the road.
5. Make sure that WORK switch **F2** (on cluster) is inactive and the vehicle is in transfer mode (CHAPTER 3).

4.5 SNOW REMOVAL OPERATIONS

4.5.1 Safety norms during snow removal operations

Below they are some safety rules for operators during snow removal:

DANGER:

1. ***DO NOT STAND NEAR THE ROTATING BLOWERHEAD.***
   AIR SACKS OR ICE SLABS CAN CAUSE A SLIPPING TO THE CUTTERS

DANGER:

BEFORE PERFORM ANY OPERATION NEAR THE CUTTERS (CHIMNEY CLEANING, BOLTS REPLACEMENT OR OTHERWISE), MAKE SURE THAT THE BLOWERS ARE STATIONARY AND REMOVE THE KEY FROM THE IGNITION PANEL.

2. ***ONCE THE OPERATIONS HAVE BEEN FINISHED, MAKE SURE THAT NO ONE IS IN THE PROXIMITY OF THE BLOWERS BEFORE RESTART THE ENGINE.***

DANGER:

3. ***IF FOR ANY CIRCUMSTANCE IS BEING TO CREATE CONDITIONS OF DANGER, IT IS NECESSARY TO STOP BLOWER ROTATION IMMEDIATELY. THE OPERATOR MUST USE THE EMERGENCY PUSH DOWN BUTTON.***

4.5.2 Snow removal instruction

IMPORTANT: For the use of the blowerhead equipment the vehicle must be in WORK modality

Once the working place is reached, operate as following:

1. Stop the vehicle and engage the parking brake (switch **5** - see CHAPTER 3).
2. Get off the cab and remove the safety bars (see paragraph 4.6).
3. Start the vehicle in stationary and low the blower head by engaging the FLOATING (keep in forward the joystick with the front button pressed for at least 3 seconds). Wait that "  " is ON on the central icon;
4. Check that the cutters touch the ground. If it is necessary, adjust the height of the blowerhead sliding element (see paragraph 4.6).
5. Start the engine (see 4.3.2).
6. With the direction lever **27** in neutral, push down the switch WORK **F2** (on main monitor, see CHAPTER 3).
7. Then select the blowers speed (1st or 2nd) by the switches **F4** or **F5** (on main monitor, see CHAPTER 3);
   - ✓ **1ST SPEED**: maximum snow removal performance;
   - ✓ **2ND SPEED**: maximum casting distance of the snow.

WARNING:
Be aware that the blowers are free to rotate. Clean the possible snow into the blower before start their rotation.

8. Push down **F7 RPM MAX** to run the engine automatically at **1800 rpm** and select the direction by control lever **27**, press the throttle pedal to move the vehicle.
   Further changes in the number of engine revolutions can be performed using the buttons **F8** and **F9** on the cluster (see CHAPTER 3). Max increment allowed 2050 rpm and decrement 950 rpm.

WARNING:
START THE REMOVAL OPERATION BY ENTERING THE SNOW GRADUALLY (FROM SMALLER LAYER TO HIGHER ONES)
IT PREVENTS SERIOUS DAMAGES TO THE TRANSMISSION AND THE BREAK OF THE SHEAR BOLTS.

NOTE:
For a correct vehicle speed observe that the snow jet is taut and steady.

9. For the vehicle provided, it is possible to use the **AUTOMATIC** (button **F5**). In AUTOMATIC the vehicle moves at a speed based on the amount of snow present, without using the throttle pedal.

To insert AUTOMATIC during operation, simply press the button from WORK modality or select WORK and AUTOMATIC before moving in forward the direction lever (at the beginning).

AUTOMATIC can be disinserted by:

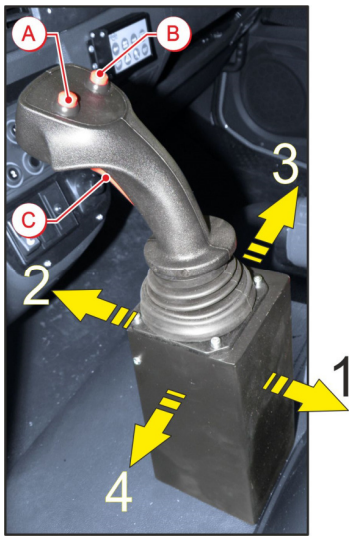
- Pressing the brake pedal
- Moving the direction lever in neutral
- Pressing again the button F5 Automatic

WARNING:
Acting on brake pedal or moving direction lever in Neutral, the AUTOMATIC mode is automatically disengaged!

At the end of the operations:

1. Stop the vehicle and move the direction lever in neutral (see CHAPTER 3);
2. Press **OFF F6** on cluster and disengage the WORK (switch **F2** - see CHAPTER 3);
3. Proceed as indicated on **4.4** for transferring.

4.5.3 Blower head movements control



The command is provided of the safety "**dead men**".

Therefore, it is always necessary to press the front button "**C**" to operate.

BUTTON "C" PRESSED:

1. BLOWER HEAD LIFTING
2. BLOWER HEAD LOWERING
3. 2ND STAGE CONVEYOR RIGHT ROTATION
4. 2ND STAGE CONVEYOR LEFT ROTATION

FLOATING: Keep the lever in forward for at least 3 seconds with button C pressed.

BUTTONS "C" + "A" PRESSED:

1. TILTING BACKWARD
2. TILTING FORWARD
3. BLOWERHEAD RIGHT ROTATION
4. BLOERHEAD LEFT ROTATION

BUTTONS "C" + "B" PRESSEND:

1. CHUTE COVER OPENING
2. CHUTE COVER CLOSING
3. CHUTE RIGHT ROTATION
4. CHUTE LEFT ROTATION

4.6 BLOWER HEAD

DANGER:

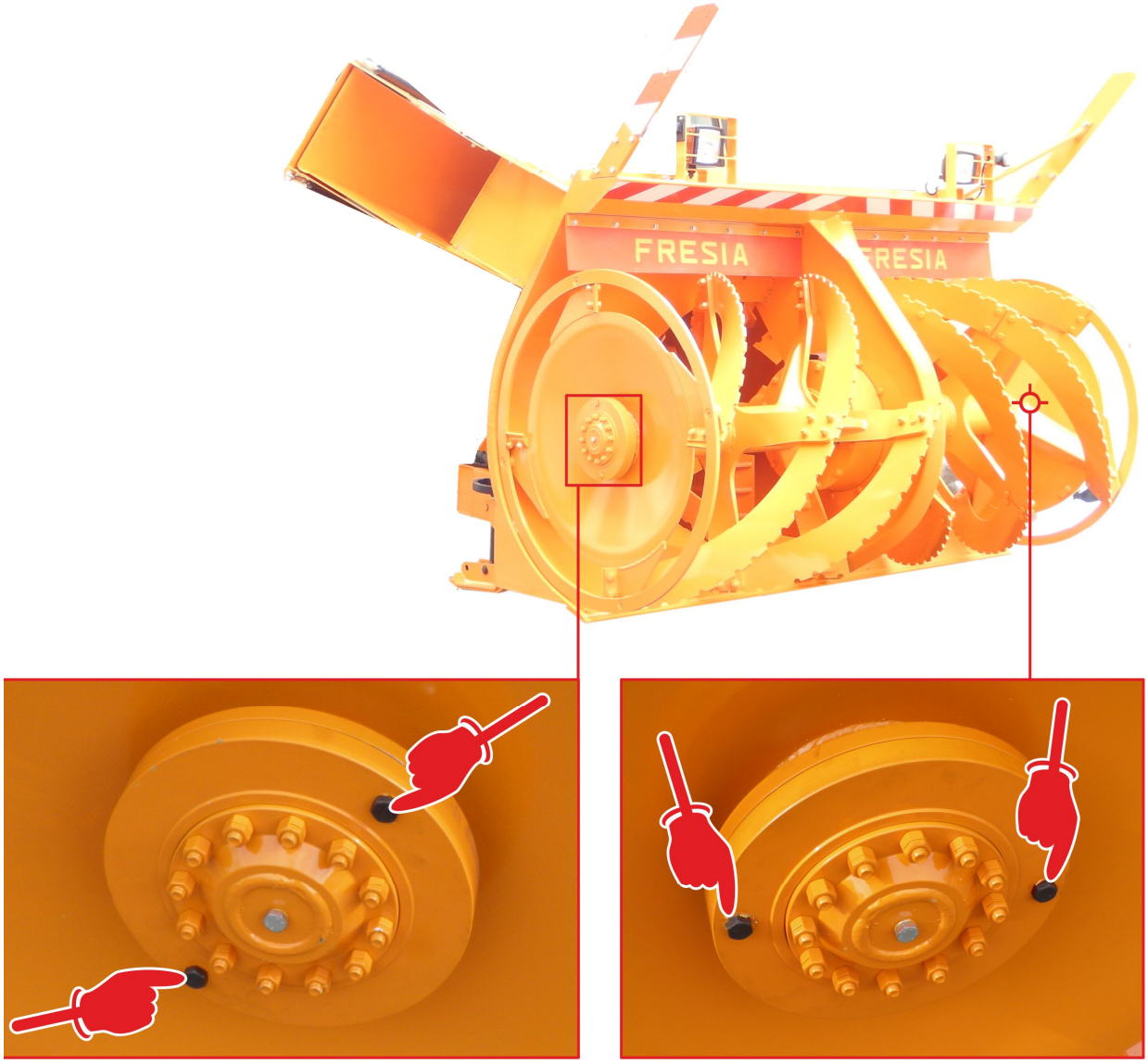
TO PERFORM THE FOLLOWING PROCEDURES, STOP THE VEHICLE ON A FLAT AREA.

4.6.1 Procedure of shear bolts replacement

Each blower is provided of two shear bolts and two shear bolts are on the second stage fan.

Their task is to prevent damage to the blower head in case outside elements enter the blower head like: rocks, wood chock, etc.

Shear bolts have the function of protecting the mechanical drive line parts when in operation or when stressed by incidental outside forces.



NOTE:
The duration of the shear bolts is not predictable.
The break depends on a number of factors including the ability of the operator.

DANGER:
SHEAR BOLTS REPLACEMENT MUST BE DONE WITH SHUT DOWN ENGINE AND KEY EXTRACTED FROM THE IGNITION PANEL.

1. Place the shear bolts into their holes and manually turn the drum until the bolt is in the hole;
2. Tighten the nuts until snug.

WARNING:
USE EXCLUSIVELY ORIGINAL SHEAR BOLTS
THE USE OF NOT ORIGINAL PARTS CAN CAUSE SERIOUS DAMAGES AT THE EQUIPMENT.

4.6.2 Procedure for sliding element adjustment

Bring the snowblower on a flat area.

DANGER:

During the adjustment be sure that no one is standing close to the vehicle

If the blade is too high or it leans before the sliding elements **D**, operate on handwheel **A** to adjust the blower head height.

4.6.3 Procedure for the installation of blower head safety bars

Lift up the blower head. Stop the engine and extract the key from the ignition panel

DANGER:

DO NOT START THE ENGINE, DURING THE INSTALLATION OF THE SAFETY BARS.

1. Extract the clips **A** from the pins **B**.
2. Fit the bar **C** on pins **B** (the oval hole should be put in lower pin).
3. Insert the spines **A** in the pins **B**.

4.7 VEHICLE TOWING IN CASE OF FAILURE

4.7.1 Short towing – less then 5 min

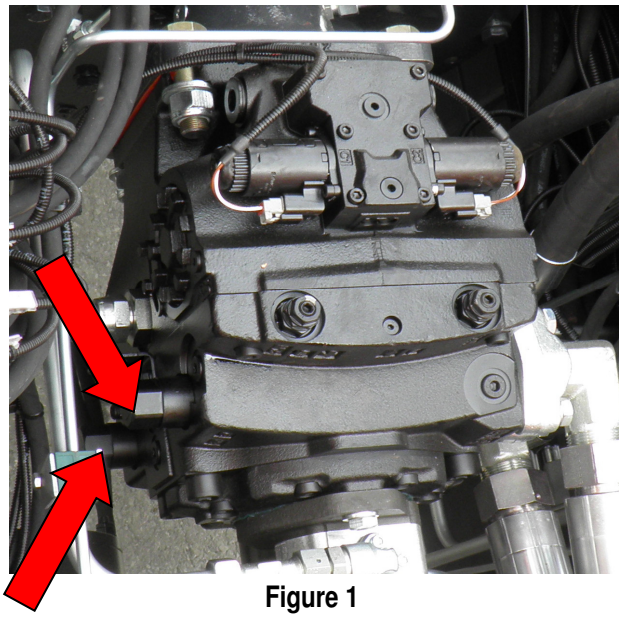


Figure 1

1. On the hydrostatic pump rotate counterclockwise for three laps the covers hexagonal shaft of two multifunctional valves, to bypass the oil (see Fig. 1).

WARNING:

To avoid oil leaks, do not rotate the hexagonal covers more then 3 turn.

Figure 2

2. For towing, use the proper hook provided with the vehicle.
   Insert the bolt into the hole in the bulkhead of the central casing and tighten the nut (see Figure 2).

WARNING:

MOVE THE VEHICLE AT A SPEED NOT EXCEEDING TO 8 KM / H FOR SHORT TIME NEEDED.

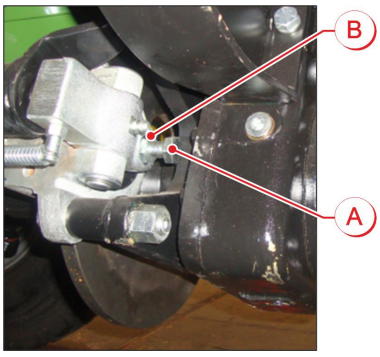


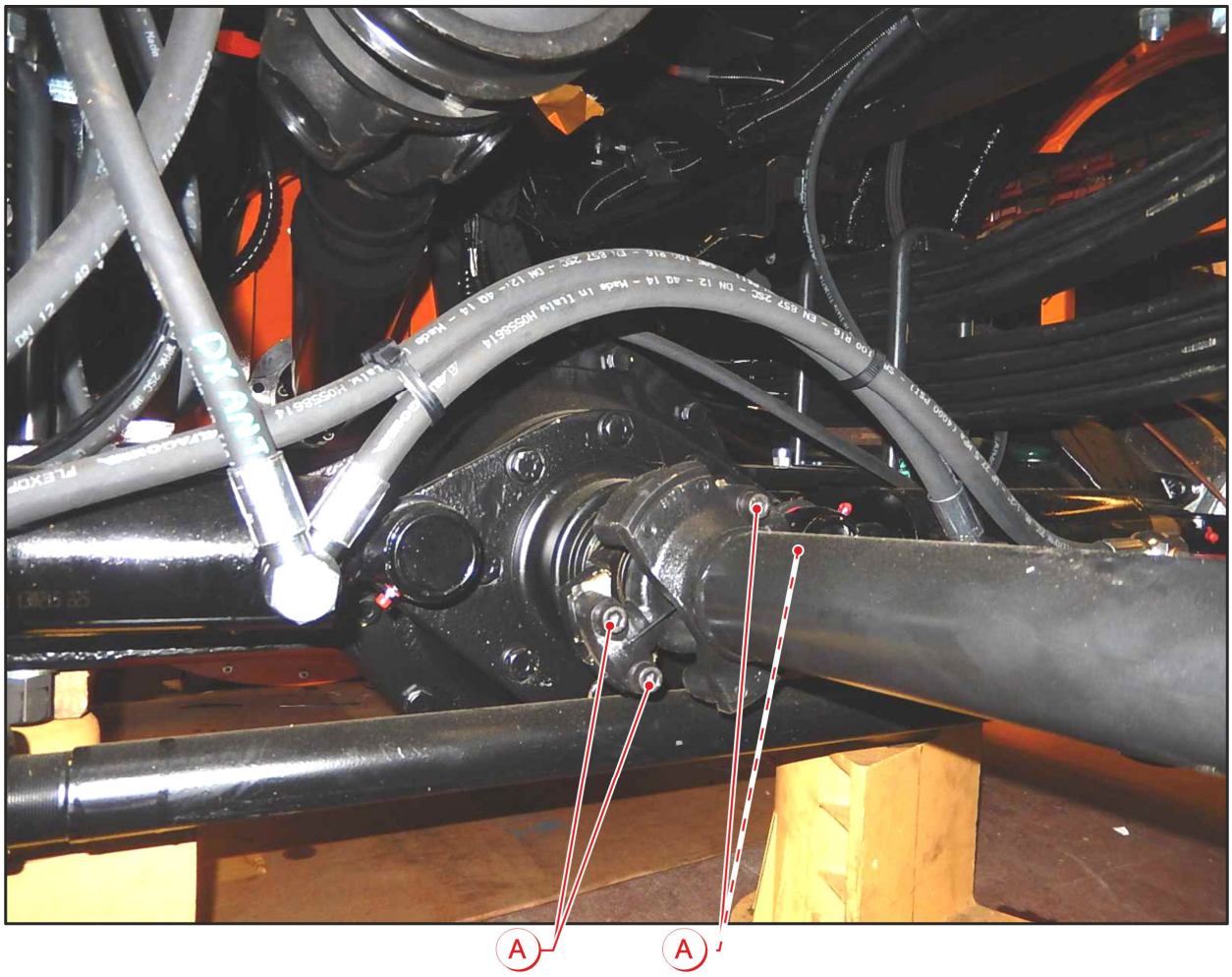
Figure 3

Disengage the parking brake unscrewing the nut **B** and the screw **A** (see figure 3).

4.7.2 Long towing – more than 5 min

In case you need to make a longer tow (for more than 5 minutes), disconnect the transmission from the front axle and ensure that the rear-traction is disengaged.

1. Unscrew the screws **A** and disconnect the transmission from the front axle.
2. Tie it with a rope to the chassis bracket.
3. Make sure that the **REAR TRACTION** is inactive.



MAINTENANCE

Paragraph *Page*

5.1 GENERAL MAINTENANCE GUIDELINES

WARNING:
To avoid the risk of contamination, the lubrication procedures must be performed paying attention to maintain the parts perfectly cleaned!

It is suggested to follow the below instructions and to read carefully the safety norms, when going to perform any maintenance operation:

a. The maximum vehicle reliability and minimum maintenance costs are the results of a carefully planned program of maintenance and inspections during the entire life of the vehicle. Scrupulously, respect the time of periodic interventions and program them, according to the specific needs in relation of the vehicle working hours.
b. Always pay your full attention to the efficiency of the lubrication of the mechanic parts, a defective lubrication can cause serious and expensive damages.
c. If repairs of a certain size are necessary, we recommend you to contact our service centre of FRESIA SpA. The specialized personnel is equipped with all the experience, technological methods of the original construction of the factory.
d. Before starting all the operations of check and maintenance, it is appropriate to thoroughly remove any dirt present on the vehicle by means of a vacuum cleaner and with appropriate detergents, avoiding the use of jets of compressed air that may create zones, in which dirt is accumulated.

DANGER:
Before starting maintenance operations, wear specific gloves and protective glasses.

e. After each maintenance operation involving removal, fixed parts and moving parts, proceed to check their exact position.

5.2 GENERAL INFORMATION

A proper and timely maintenance of the vehicle is necessary to ensure its efficiency and prevent failures. The maintenance schedule (see § 5.4) with periodic recommended checks and all necessary maintenance must be strictly adhered to.

- ✓ Whenever it was made a refill or a change of liquids, the operator must always check the vehicle before using it.
- ✓ It is strongly recommended to verify that no leaks are present before and after each use of the vehicle
- ✓ Verify the parts subject to dirt and keep them more cleaned than possible.
- ✓ The whole vehicle should be regularly washed.

5.3 VEHICLE CLEANING

5.3.1 External cleaning

Once the doors and windows are closed and the engine is off, the vehicle can be washed with water or with a steam jet.
If the washing is performed under conditions of extreme cold weather the latches and the hinges of the main gates should be thoroughly dried and when necessary can be used antifreeze.
For painted parts cleaning, it is suggested not to use gasoline.

5.3.2 Internal cleaning

For internal cleaning can be used fresh water with brush and sponge.
Note that all the electrical parts are water repellent but not waterproof. Therefore, the use of water or steam can cause serious damage, short-circuiting or rust.
The performance and the duration of rusted electrical contacts may be compromised.

5.3.3 Engine washing

When washing the engine, the air filter must be protected, to prevent infiltration of water as well as the engine control unit should not be sprayed with water under pressure.

MAINTENANCE SHEET	INTERVENTION	FREQUENCY						
		BEFORE STARTING	EVERY 50 HOURS	EVERY 250 HOURS	EVERY 500 HOURS (1 YEAR)	EVERY 1000 HOURS (2 YEARS)	EVERY 1250 OURS (2 YEARS)	EVERY 2000 HOURS (4 YEARS)
A_TRACTION ENGINE								
01	Oil level check	X	X	X	X	X	X	X
02	Cooling liquid check	X	X	X	X	X	X	X
03	Drain the water from fuel pre-filter	X	X	X	X	X	X	X
04	Leaks from sleeve check		X	X	X	X	X	X
05	Engine belt condition check		X	X	X	X	X	X
07	Fuel filter replacement			X	X	X	X	X
08	Fuel pre-filter replacement			X	X	X	X	X
09	Oil filter replacement			X	X	X	X	X
10	Engine oil replacement			X	X	X	X	X
11	Radiator cleaning			X	X	X	X	X
12	Air filter cartridges replacement				X	X		X
14	Engine belt replacement						X	X
B_HYDRAULIC AND HYDROSTATIC SYSTEM								
01	Hydraulic and hydrostatic oil level check	X	X	X	X	X	X	X
02	Hydrostatic oil filter replacement			X	X	X	X	X
03	Hydraulic oil filter replacement			X	X	X	X	X
04	Hydraulic and hydrostatic. oil replacement					X		X
C_AXLES								
01	Wheels hub oil level check		X	X	X	X	X	X
02	Differential oil check and steering heads greasing		X	X	X	X	X	X
03	Lubricate axle articulations, steering cylinders,		X	X	X	X	X	X
04	Wheel hubs oil replacement				X	X		X
05	Differential oil replacement				X	X		X
06	Steering and shackle bar heads check				X	X		X

MAINTENANCE SHEET	INTERVENTION	FREQUENCY						
		BEFORE STARTING	EVERY 50 HOURS	EVERY 250 HOURS	EVERY 500 HOURS (1 YEAR)	EVERY 1000 HOURS (2 YEARS)	EVERY 1250 OURS (2 YEARS)	EVERY 2000 HOURS (4 YEARS)
D_SUSPENSIONS								
01	Suspension lubrication		X	X	X	X	X	X
02	Check nuts connecting leaf springs to the axles			X	X	X	X	X
E_TRANSFER REDUCER								
01	Transfer reducer oil level check	X	X	X	X	X	X	X
02	Transfer oil replacement				X	X		X
F_BLOWERHEAD								
01	Blower head blade wearing check	X	X	X	X	X	X	X
02	Blower helical cutters wearing check	X	X	X	X	X	X	X
03	Second stage paddles wearing check	X	X	X	X	X	X	X
04	Blower head lubrication		X	X	X	X	X	X
05	First stage oil level check		X	X	X	X	X	X
06	Second stage oil check		X	X	X	X	X	X
07	First stage oil replacement				X	X		X
08	Second stage oil replacement				X	X		X
G_TYRES								
01	Tyres pressure check	X	X	X	X	X	X	X
02	Wheel nuts torque check		X	X	X	X	X	X
H_TWO SPEED BACK GEAR								
01	Two speed back gear oil level check		X	X	X	X	X	X
02	Two speed back gear oil level replacement				X	X		X

5.4.1 General periodical checks

- ✓ Check for leaks all mechanical system.
- ✓ Check for leaks hoses and sleeves.
- ✓ Check steering efficiency.
- ✓ Check lighting, indicator and warning lights windshield wiper and horn.
- ✓ Check the muffler condition

5.5 FREQUENT SPARE PARTS

A. TRACTION ENGINE

Air filter cartridges:

- ✓ Cartridge (nr.1) ⇒ **21702911**

Oil filter:

- ✓ Oil filter cartridge by-pass (nr.1) ⇒ **23075367**
- ✓ Oil filter cartridge (nr.2) ⇒ **23075366**

Fuel filters:

- ✓ Fuel filter cartridge (nr.1) ⇒ **22480372**
- ✓ Fuel pre-filter cartridge (nr.1) ⇒ **20998367**

Belt:

- ✓ Engine belt ⇒ **3838617**
- ✓ Alternator belt ⇒ **20430376**

B. SNOWBLOWER

- ✓ Front blade iron L.2500 (nr.1) ⇒ **00108502**

- ✓ Internal cutter (right roller) ⇒ **00108473**
  External cutter (right roller) ⇒ **00108479**
  Internal cutter (left roller) ⇒ **00108474**
  External cutter (left roller) ⇒ **00108480**

- ✓ **Roller shear bolts**
  Screw (nr.4) ⇒ **00083299**
  Nut (nr.4) ⇒ **D0002582**

- ✓ **Fan shear bolts**
  Screw (nr.2) ⇒ **00083301**
  Nut (nr.2) ⇒ **D060.121**

5.6 OILS AND FUELS

COMPONENT	OLII	QUANTITY (LITRES)
ENGINE	OBL LH 5W30* (SAE 5W/30)	**48**
COOLING LIQUID	ACG/S (to be mixed with 50% water)	**60**
HYDRAULIC AND HYDROSTATIC SYSTEM	TUTELA CAR G1/E* (ATF DEXRON III – C4)	**70**
AXLES	TUTELA W90/M-DA* (SAE80W/90)	**7,5+7,5**
PLANETARY GEAR	TUTELA W90/M-DA* (SAE80W/90)	**1x4**
TRANSFER REDUCER	TUTELA W90/M-DA* (SAE80W/90)	**2,5+1,5**
TWO SPEED BACK GEAR	TUTELA W90/M-DA* (SAE80W/90)	**20**
1ST STAGE GEARINGS	TUTELA W90/M-DA* (SAE80W/90)	**10**
2ND STAGE GEARINGS	TUTELA W90/M-DA* (SAE80W/90)	**2,5**
GREASING SYSTEM	TUTELA MR3*	**----------**
DIESEL	DIESEL SPECIFICATIONS EN590	**500**

* **PETRONAS** oil used on vehicle

5.7 MAINTENANCE TO PERFORM IN PERIOD OF INACTIVITY

WARNING:
It is important to follow the maintenance instructions also during the period when the machine is not used!

1. At the end of the working season, provide to wash the whole vehicle: intern and extern.
2. Check all the oil levels.
3. Lubricate all the part that needs it.
4. Start the engine every 15-20 days.
5. Every 15-20 days, check that no leaks are present on vehicle. If leakages are present, check for cause.
6. The vehicle must be parked with the blade in floating mode on ground.
7. Check the tyres pressure every 15-20 days.

5.7.1 Care instruction for inactive engine

To prevent the engine from being harmed during long (2 months or more) periods out of service, it must be conserved.

Because a correct conservation is important, we have compiled a checklist covering the most important points.

CAUTION!

Read the chapter on Maintenance before starting work. It contains instructions on how to carry out maintenance and service operations in a safe and correct manner.

WARNING!

Conservations oils can be flammable and dangerous to inhale. Ensure good ventilation. Use a protective face mask when spraying.

IMPORTANT!

Remember the following must be considered when cleaning with a high-pressure water jet: Never point high pressure water jets directly at seals, rubber hoses or electrical components. Never use the high-pressure function when washing the engine.

For up to 8 month's stoppage:

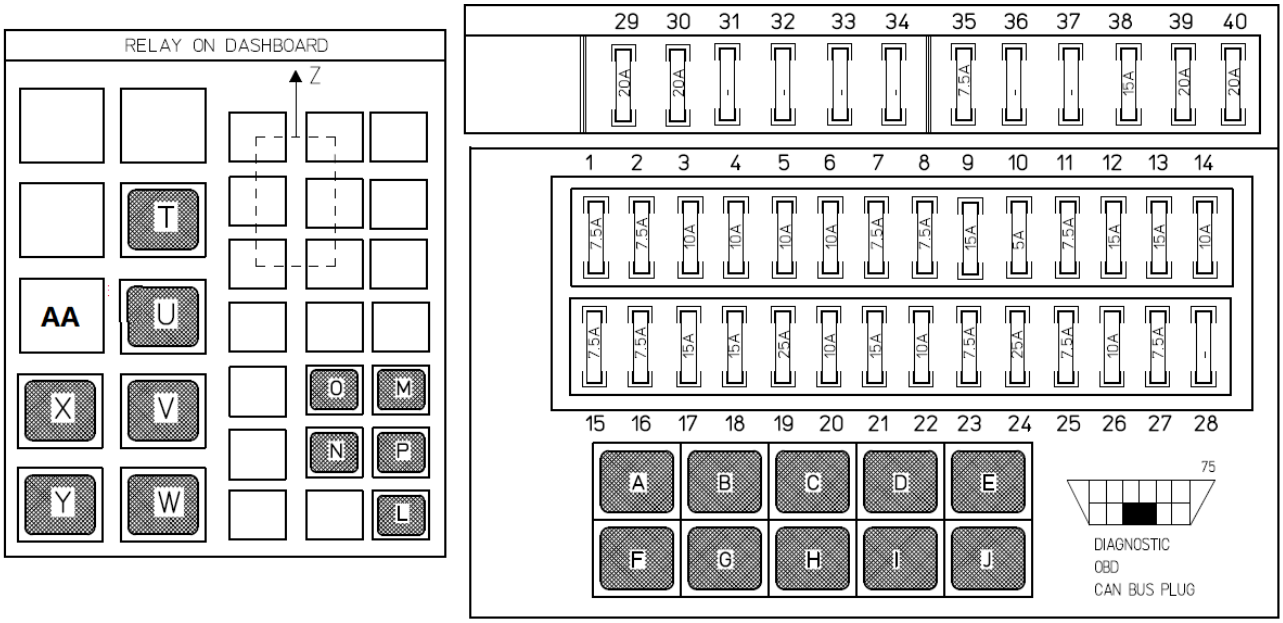
1. Change the oil and oil filter on the engine, then, run the engine until warm.

More than 8 month's stoppage:

2. Conserve the lubrication and fuel systems with conservation oil.
3. Make sure that the coolant has adequate antifreeze properties. Top up as necessary.
4. Alternatively, you can drain the coolant (also drain the coolant filter).
5. Drain any water and contamination from the fuel filters and fuel tank. Fill the fuel tank completely, to avoid condensation.
6. Disconnect the battery cables, clean and charge the batteries. Trickle charge the batteries while the equipment is in storage. **A poorly charged battery can freeze and burst**.
7. Clean the outside of the engine. Do not use an high pressure washer for engine cleaning.
8. Check and rust-proof any control cables.
9. Put a note on the engine with the date, type of conservation and the conservation oil used.
10. Cover over the air filter, exhaust pipe and engine if necessary.

5.8 FUSES, RELAIS AND CONTROL UNITS

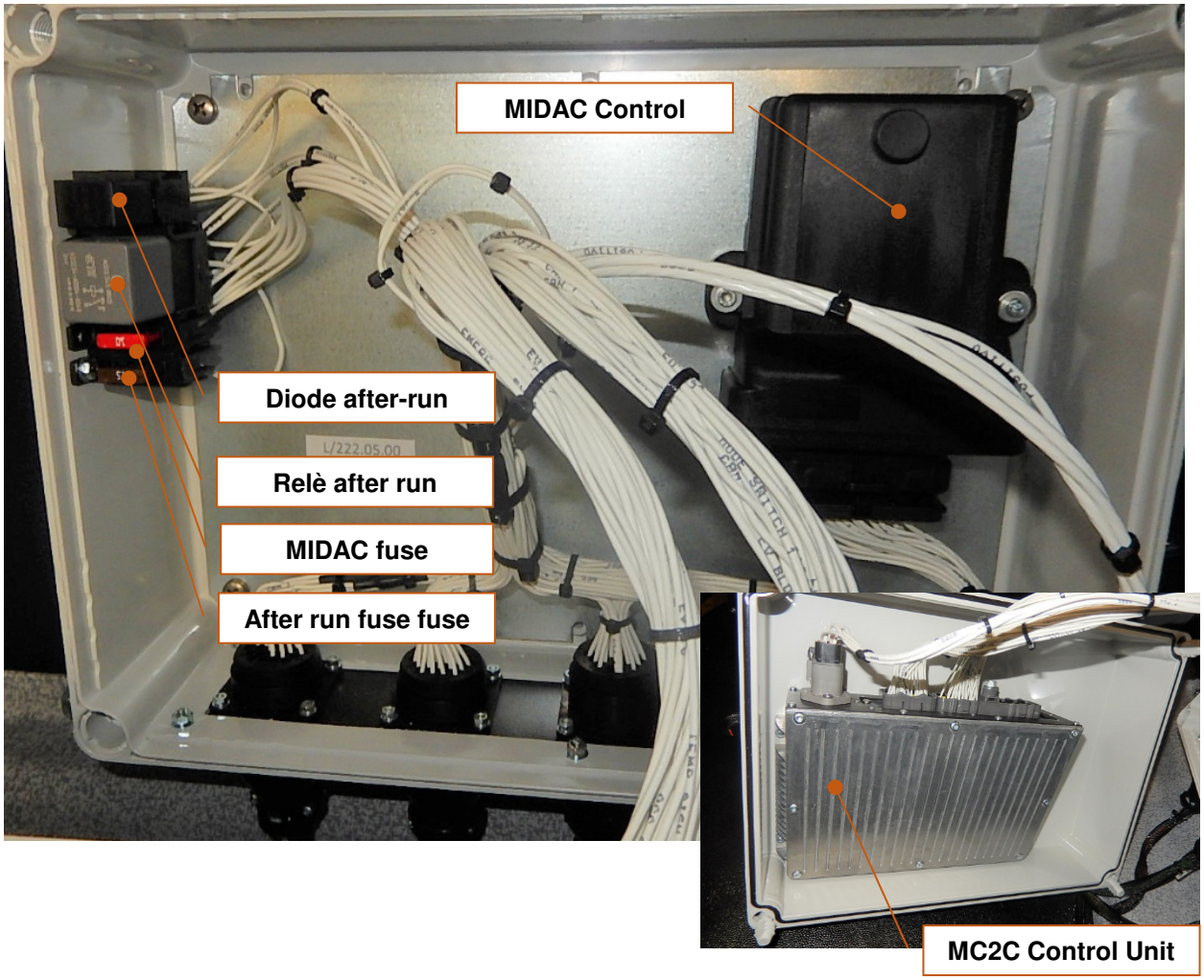
(IN CAB, FRONT OF PASSENGER)



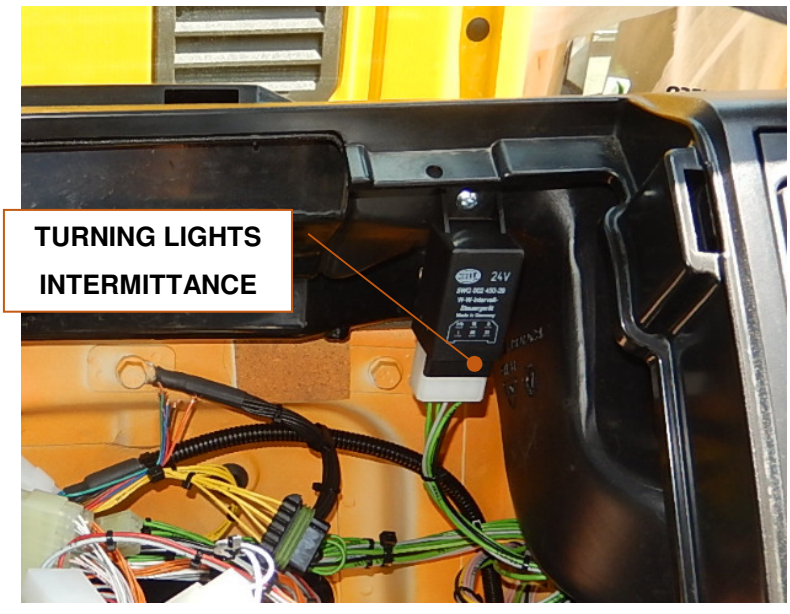
Fuses		Relais
1-Right position lights	23-Cab lights	A-Position lights
2-Left position lights	24-Oil exchanger	B-Beam lights
3-Right beam lights	25-Heater mirrors	C-High lights
4-Left beam lights	26-Instrument, GPS	D-Flashing
5-High lights	27-Horn – Emergency lights	E-Main relay (services)
6-High lights	28-	F-Beacons
7-Hand brake	29-Right heater lateral window	G-Rear window heater
8-Rea fog lights	30-Left heater lateral window	H-Horn
9-Switches and windows	31-	I-Work lights
10-Engine	32-	J-Oil exchanger
11-Cluster-Brake / steering sensors	33-	L-Stop lights
12-Sauer Danfoss	34-	M-Mirrors heater
13-PLC-Push buttons	35-Joystick and direction lever	N-Fog lights
14-Cab fan	36-	O-Hand brake
15-Direction lights and stop lights	37-	P-Reverse
16-Reverse lights	38-Webasto	R-
17-Windshield wiper	39-Right heater windshield	S-
18-Work lights	40-Left heater windshield	T-U-V-W-Superior and inferior lights
19-Beacons		X-Left lateral window heater
20-Radio		Y-Right lateral window heater
21-Heated rear window		Z-Windshield and lateral heater
22-Fog lights		

AA – Turn lights intermittance

(PLC CASE)



(IN FRONT OF THE DRIVER, BEHIND THE CLUSTER)



5.9 BATTERIES INFORMATION

General periodical checks

After a certain time, even when the battery is not connected to any consumers, it becomes electrically empty. This occurrence is described as self-discharge and is caused by the chemical processes in the battery.

The extent of self-discharge depends upon the temperature, the acid-mass ratio and the battery technology.

A change in the storage temperature of 10°C results in a doubling of self-discharge (Arrhenius' Law). Self-discharge has a special influence in the case of seasonally employed vehicles such as those used in agriculture and the construction industry, motorcycles, caravans and convertibles.

In order to prevent irreparable damage, all batteries must be recharged from a voltage of 12.50 V.

Batteries connection

During series connection, the voltages of the individual batteries accumulate. In order to create a 24 V electrical supply system, two batteries must be connected in series.

Please note:

- Both batteries must have the same type designation.
- Both batteries must be of roughly the same age.
- Both batteries must have the same charge status.
- The connecting lines must have sufficient dimensions and be as short as possible.
- Always change both batteries!

Should the aforementioned recommendations not be followed, differing internal resistance of the individual batteries causes a corresponding voltage distribution and thus an asymmetrical load during
the loading and discharge phase.

The charging equalizer provides two batteries connected in series with a uniform charge status

Output capacity and engine requirement

A battery has its maximum output capacity at a room temperature of 25°C. The colder the temperature, the slower the chemical processes in the battery and hence the lower its output capacity.

Engines also prefer warm temperatures, as the engine oil is more fluid and friction is reduced. However, as the temperature falls, the energy required for starting increases massively. Consequently, the
highest starting power is required when the battery has a poor output capacity.

Therefore, many batteries tend to fail in the cold period of the year.

Batteries installation and removal

Always heed the safety warnings!

- Only install batteries with an open circuit voltage of >12.50 V in a vehicle!

- Follow the vehicle instructions.

-Before fitting or removing the battery, switch off the engine and all power consumers.

- Avoid short circuits due to tools.

- When removing the battery, first disconnect the negative (-) terminal and then the positive (+) terminal.

- Prior to fitting the battery, clean the battery compartment.

- Ensure that the battery is secured tightly.

- Clean terminals and battery clips and lubricate slightly with acid-free grease.

- When fitting the battery first connect the positive (+) terminal and then the negative (-) terminal. Ensure that the clips are secured.

- Original parts and sleeves are to be put back in place.

Storage

- Only store fully charged batteries with short circuit protection.

- Batteries are to be kept in a dry, light-protected and cool (frost-free) place.

- The open circuit voltage of the batteries is to be checked regularly and from 12.50 V the batteries are to be recharged.

- If a battery is to be taken out of service in the winter months, it should be removed from the vehicle.

- If the battery is left in the vehicle, the negative terminal should be disconnected.

- As an alternative, a charge retention device can be use

Batteries maintenance

Check on the correct connection of the battery cable.

- Loose battery cables result in increased transitory resistance, which leads to incomplete charging and reduced cold starting current.

- The battery may not be covered in dirt. Increased self-discharge derives from permanent creepage current.

- Terminals must be kept clean and greased.

- Oxidized terminals also result in increased transitory resistance, which leads to incomplete charging and reduced cold starting current.

- Regular checks of the electrolyte level in wet batteries and if necessary, top up with demineralized or distilled water to the maximum acid mark, or 15 mm above the upper plate edge. Never refill with acid. In the case of high water losses, a specialist should check the governor voltage.

5.10 FAILURE CODES

5.10.1 VOLVO Tier 3 Engine

SPN	Component	FMI
20	Coolant Water Pressure	1, 3, 5, 18
51	Engine Throttle position (cold)	3, 5, 7, 12, 13
91	Accelerator Pedal position	0, 9, 19
94	Fuel Delivery Pressure *Maintenance, page 73*	3, 5, 12, 18
97	Water in fuel indicator *Draining condensate, fuel system, page 73*	0, 4, 12
98	Engine Oil Level *Oil level, checking and topping up, page 70*	1, 4, 5, 18
99	Engine Oil Filter Differential Pressure	0
100	Engine Oil Pressure *Oil level, checking and topping up, page 70*	1, 3, 4, 5, 18
101	Crankcase pressure	0, 3, 5
102/106	Boost pressure	0, 3, 4, 5, 16
105	Boost temperature	0, 4, 5, 16
107	Air filter pressure	0, 3, 4, 5, 12
108	Ambient air pressure	5
110	Coolant Temperature *Coolant Level, Checking and Topping Up, page 78*	0, 4, 5, 16
111	Coolant Level *Coolant Level, Checking and Topping Up, page 78*	1, 3, 4, 5, 18
131	Exhaust back pressure	3, 5, 12
153	Crankcase pressure	0, 2, 3, 5
158	ECU battery potential *Battery, Charging*	0,1, 2
164	Injection control pressure	2, 4, 5
171	Ambient Air Temperature Sensor	14
172	Ambient Air Temperature Sensor	4, 5
173	Exhaust gas temperature	0, 16
175	Engine Oil Temperature *Oil level, checking and topping up, page 70*	0, 3, 4, 5, 16
190	Engine Speed	0, 16
608	Throttle position	9
626	Preheat relay	3, 4, 5
626	Inlet Air Temperature	3, 4, 5
628	Program Memory	2
629	Controller error	8, 12
636	Camshaft sensor	7, 8, 9
637	Crankshaft sensor	2, 8, 9
639	J1939 Network #1 Primary Vehicle Network	2
647	Engine Fan Driver	3, 4, 5

651	Fuel Injector, Cylinder #1	3, 5
652	Fuel Injector, Cylinder #2	3, 5
653	Fuel Injector, Cylinder #3	3, 5
654	Fuel Injector, Cylinder #4	3, 5
655	Fuel Injector, Cylinder #5	3, 5
656	Fuel Injector, Cylinder #6	3, 5
677	Starter motor relay	3, 4, 5, 6
679	Injection Control Pressure Regulator	3, 4, 5, 6
679	Pressure Release Valve	0, 7, 11, 14
729	Preheater	5, 6, 7, 12
970	Engine stop switch	3, 4, 5, 11, 14
1136	ECU temperature	16
1184	Exhaust gas temperature	0, 4, 5, 16
1188	Wastegate Valve	3, 4, 5
1485	ECM Main Relay	7
1639	Fan speed	3
1668	J1939 Network #4 (engine subnet)	2
2017	Lost Communication (Source Address 17)	9
2036	Lost Communication (Source Address 36)	9
2659	Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate	18
2791	Internal EGR	7
2988	Thermostat bypass valve	3, 4, 5
3241	Exhaust gas temperature	19
3364	Aftertreatment Tank Reagent Quality	2, 17
3464	Engine throttle actuator (cold) Engine Throttle Actuator	3, 4, 5, 7, 10, 12
3509	Sensor Supply Voltage #1 (+5 V DC)	3, 4
3510	Sensor Supply Voltage #2 (+5V DC)	3, 4
3511	Sensor Supply Voltage #3 (+5V DC)	3, 4
520193	Sea Water Pressure	1, 3, 4, 5, 18
520335	ECU battery potential	5
520416	Lost communication with reductant control module on engine subnet	9
520567	Aftertreatment Exhaust Temperature - Wet	0, 3, 4, 5, 16
520570	Engine Oil Pressure Before Filter	3, 4, 5, 11
520688	Aftertreatment Exhaust Temperature - Dry	0, 3, 4, 5, 16
520689	EGR "A" / Volvo Compression Brake (VCB) Control Circuit	3, 4, 5
520690	EGR "A" Control / Turbocharger/Supercharger Wastegate Solenoid "A"	3, 5
520691	Torque Speed Control 1 Received With Errors (Counter or Checksum)	14

5.10.2 Failures into the hydrostatic traction DANFOSS

Three types of error:

1.	System state	SYS	1 digit
2.	Input state	IN	4 digits
3.	Output state	OUT	4 digits

STATE OF THE SYSTEM

0 - NO failure

1 - Low battery tension

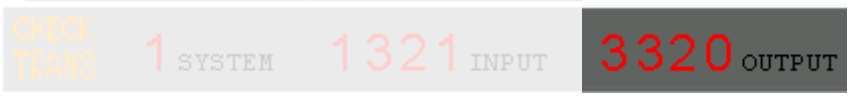
2 - Not correct tension for engine rpm sensor (5 volt)

3 - Not correct both tensions (battery and engine sensor)

1. INPUT STATE:

0 - NO failure	**0 -** NO failure	**0 -** NO failure	**0 -** No failure
1 - Switch FNR (direction lever)	**1 -** Accelerator pedal	**1 -** /	**1 -** Hydraulic motor RPM sensor
2 - /	**2 -** Ump RPM (engine speed sensor)	**2 -** Mode switch 2	**2 -** /
3 - /	**3 -** Driving sensor and ump RPM	**3 -** Pump angle sensor and mode switch 2	**3 -** /

2. OUTPUT STATE:



0 - NO failure	**0 -** NO failure	**0 -** NO failure	**0 -** NO failure
1 - Pump valve FWD (forward valve)	**1 -** Motor valve PROP (valve on motor)	**1 -**	**1 -** /
2 - Pump valve REV (reverse valve)	**2 -** C2P05 (warning light)	**2 -** Motor BPD valve	**2 -** /
3 - Pump valve FWD e pump valve REV	**3 -** Motor PROP and C2P05	**3 -** C206 and BPD	**3 -** /

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **A_01**

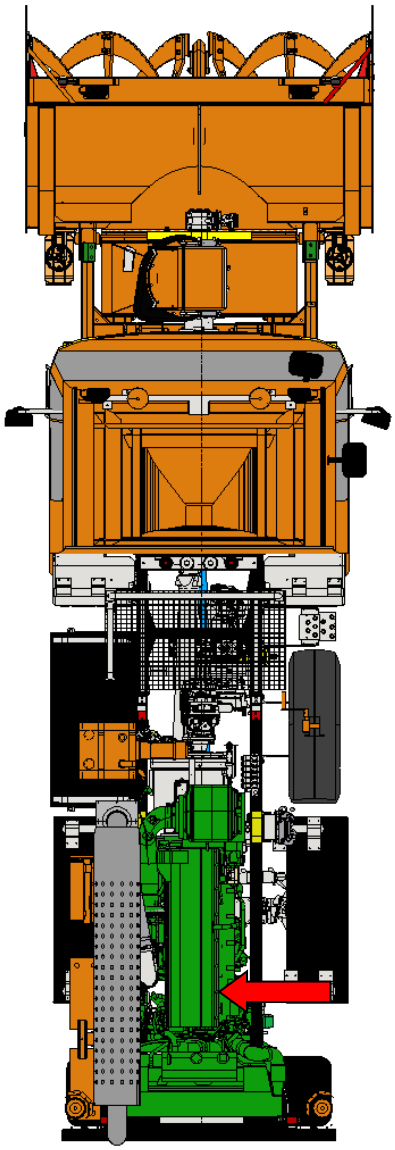
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: OIL LEVEL CHECK

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time:**	5 minutes

Action points:

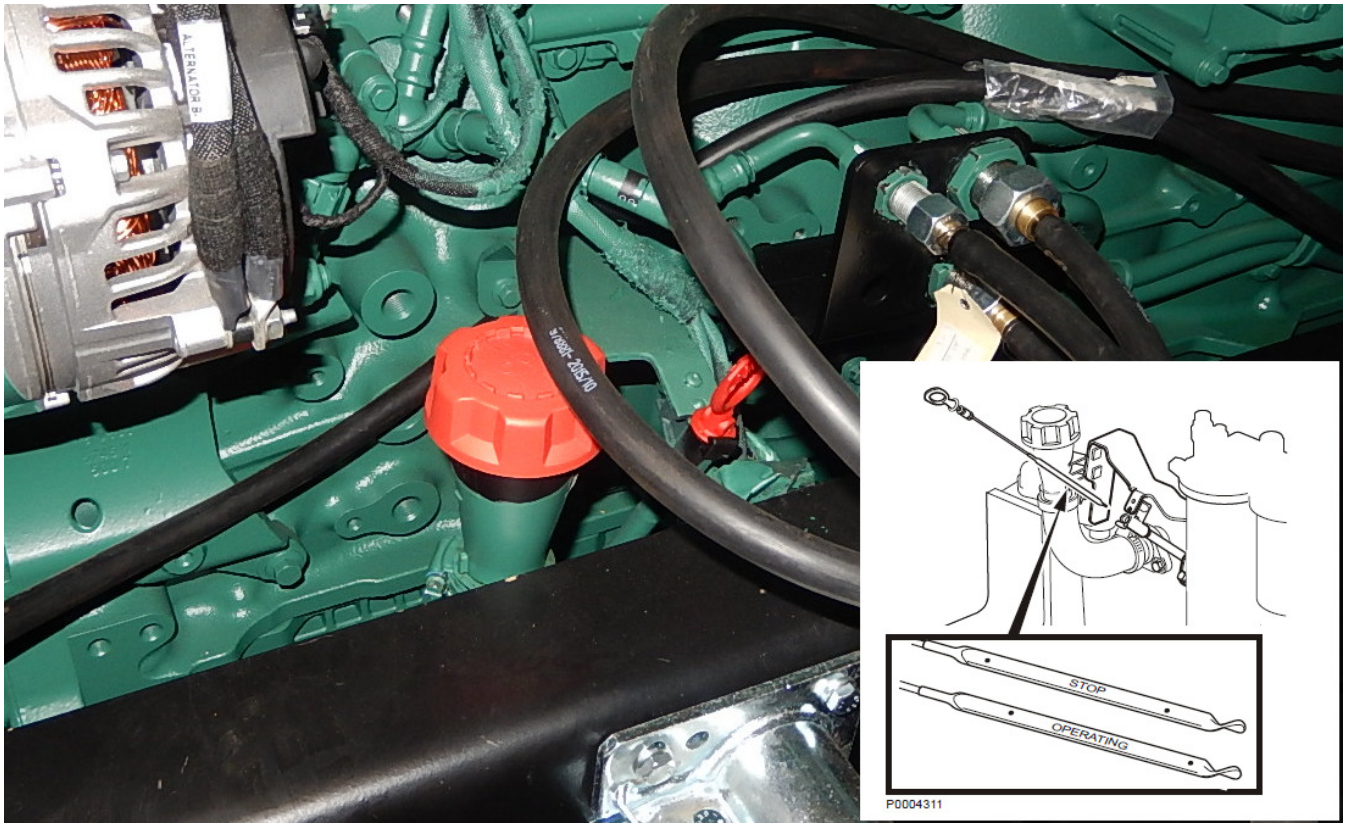


Requested spare parts:

- Use only **OBL LH 5W30** oil or equivalent

Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA



The oil level can be checked either when the engine is stopped (the STOP side of the dipstick) or when it is running (the OPERATING side of the dipstick).

WARNING:
Never fill over the MAX limit on the oil dipstick. Only use recommended oils.

a) Extract the dipstick and clean it with a cloth.

b) Re-insert the dipstick and extract it again. Do the check, the level must be between the MIN and the MAX marks.

c) If necessary, refill. Only fill when the engine is stopped.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION

Sheet n°

A_02

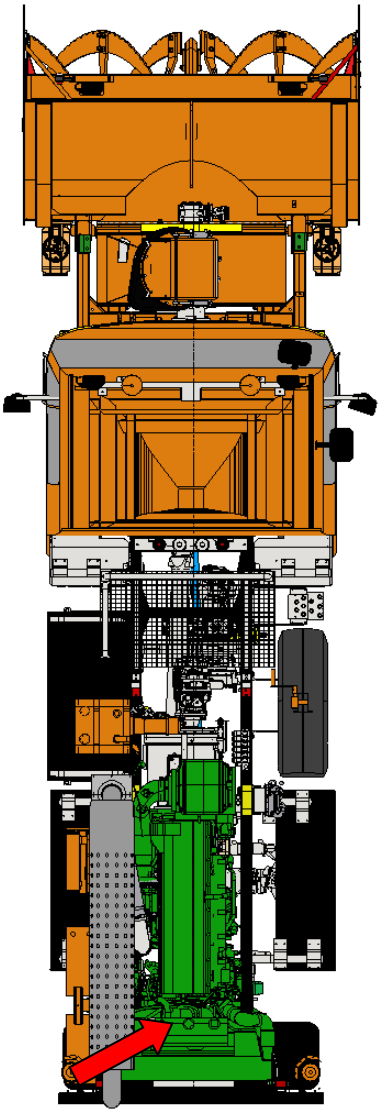
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: COOLING LIQUID CHECK

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SSUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required type:**	2 minutes

Action points:



Spare parts requested:

- Cooling liquid **ACG/S** (or equivalent).

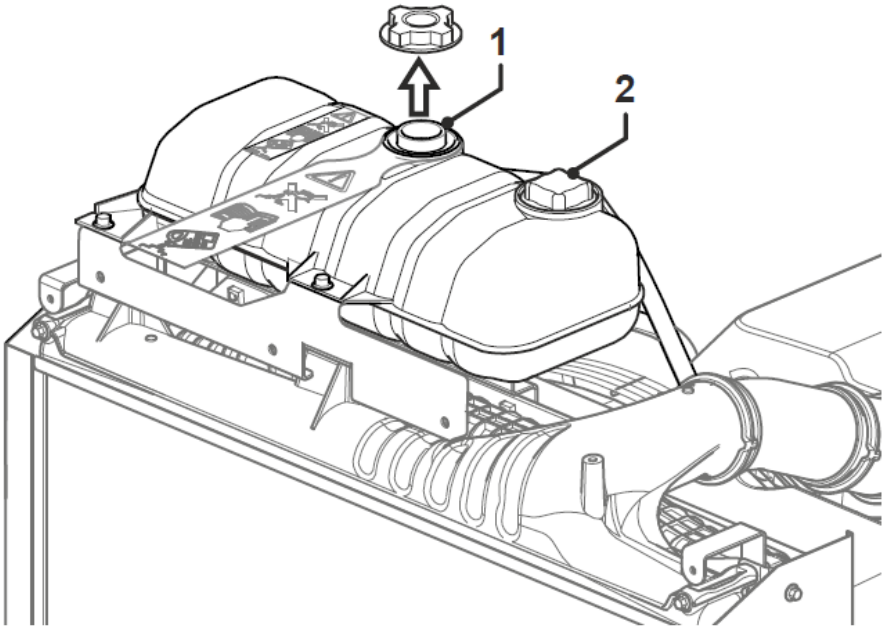
Specific tool:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force

WARNING:

THE CHECK MUST BE DONE WITH STOPPED AND COOLED ENGINE.



a) Only open the filler cap (1). Do not open the pressure cap (2).

b) Check that the coolant level is above the MIN mark on the expansion tank.

c) Top up with coolant as required, so that the level is between the MIN and MAX marks.

Fill slowly, to allow air to flow out.

WARNING:
Only use the recommended coolant.
Top up with the same type of coolant as already used in the system. Different types of coolant must not be mixed.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION

Sheet n°

A_03

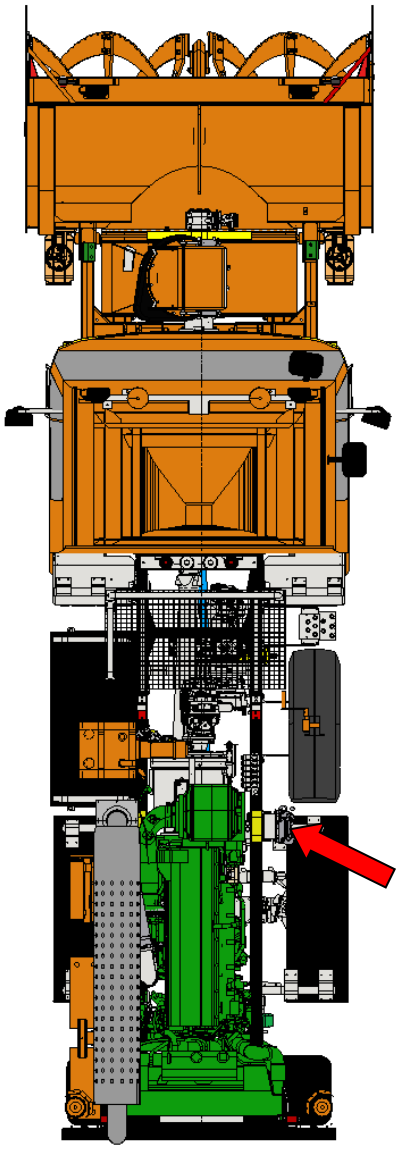
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: DRAIN THE WATER FROM THE PRE-FILTER

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time:**	2 minutes

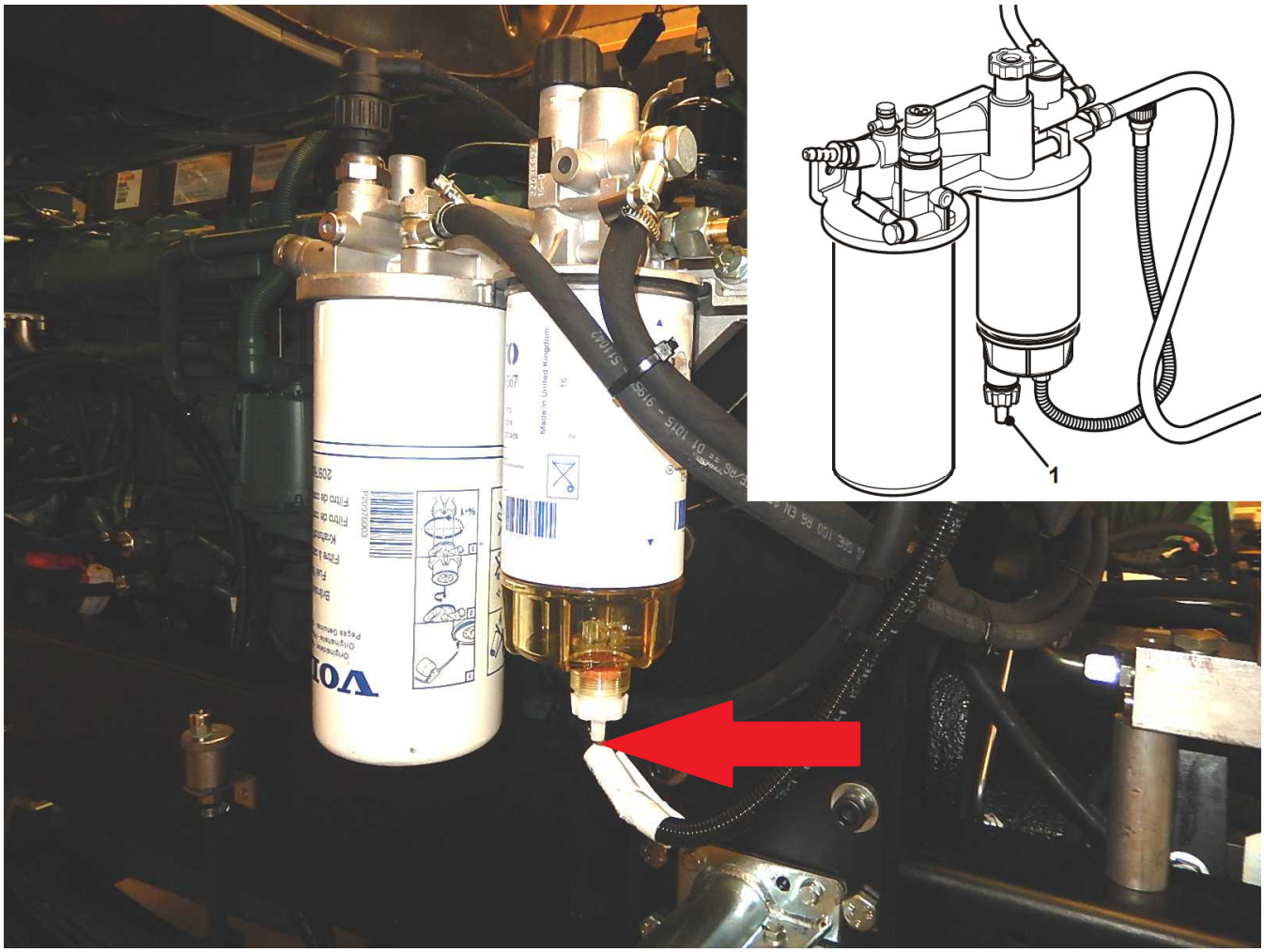
Acting point:



Requested spare parts:	**Specific tools:**

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



a) Put a container under the pre-filter and open the drain tap (1) in the base of it.

b) Tighten the drain tap (1) when fuel without water starts to run out.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

A_04

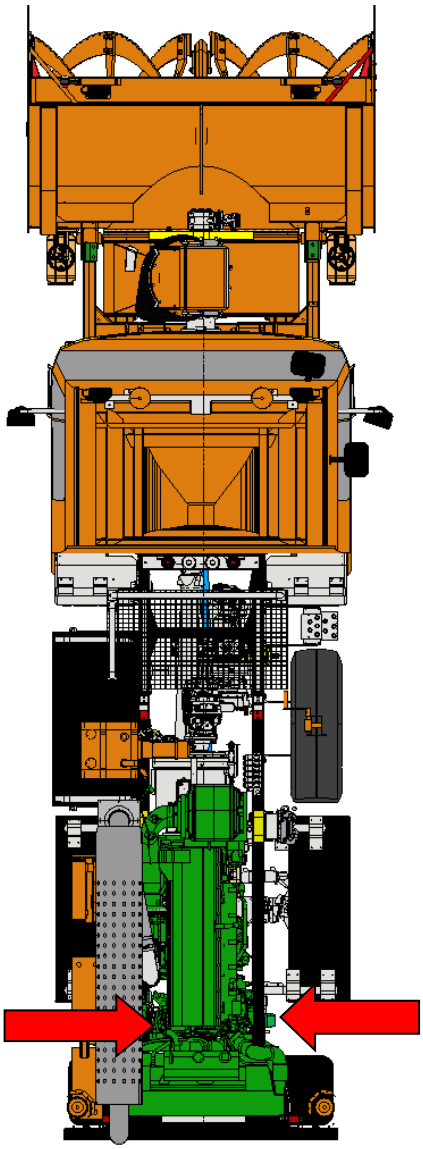
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: LEAKS FROM THE SLEEVES CHECK

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	5 minutes

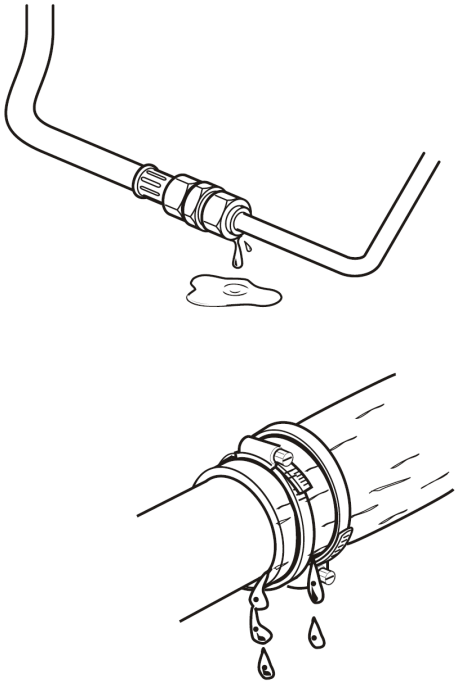
Acting points:



Requested spare parts:	**Specific tools:**

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



Make it an habit to give the engine and engine compartment a visual inspection before starting the engine and after operation once the engine has stopped. This will help you to discover quickly if anything abnormal has happened, or is going to happen.

Look especially carefully at oil, fuel and coolant leakage, loose bolts, worn or poorly tensioned drive belts, loose connections, damaged hoses and electrical cables. This inspection only takes a few minutes and can prevent serious malfunctions and expensive repairs.

WARNING:
Accumulations of fuel, oil and grease on the engine or in the engine room is a fire hazard and must be removed immediately they are detected.

WARNING:
If an oil, fuel or coolant leak is detected, it is necessary to investigate the causes and to rectify the fault before the stating the engine.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

A_05

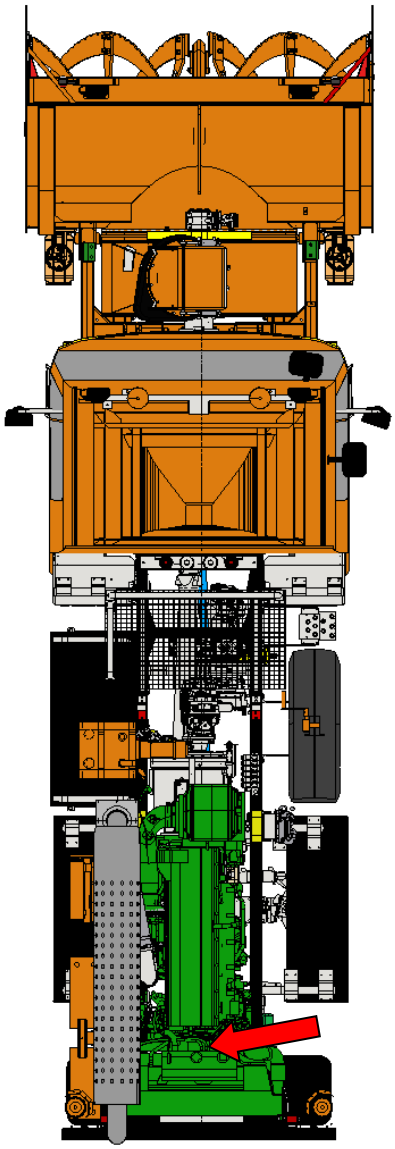
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: ENGINE BELTS CONDITIONS CHECK

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	5 minutes

Acting points:



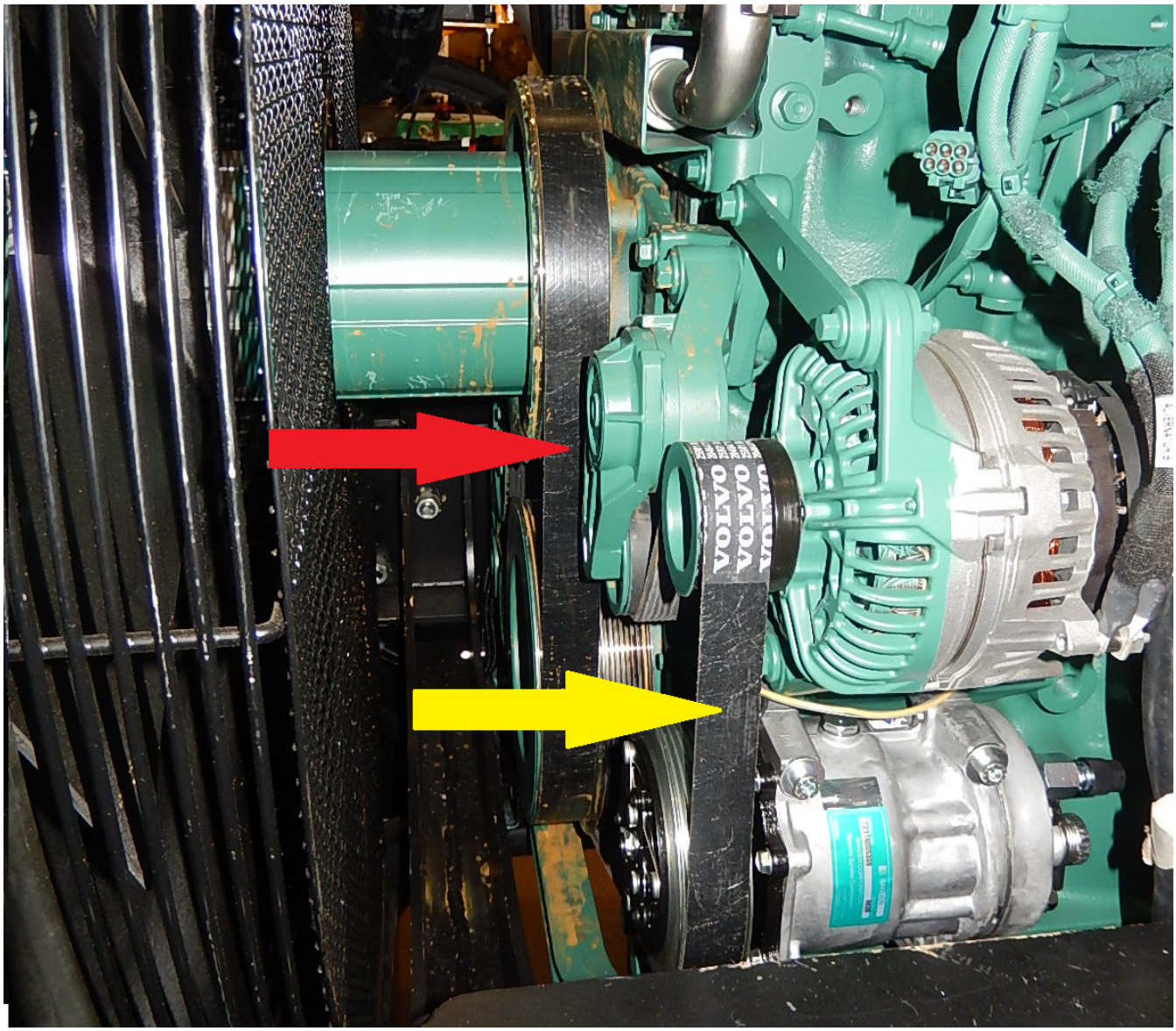
Spare parts requested:

- Belt code **3838617**
- Alternator belt code **20430376**

Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



Check the conditions of the engine belts (red arrow) and the air compressor belt (yellow arrow).

If it is necessary. Replace them, following the procedure for the belts replacement (sheet 13).

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet n°**	**A_07**
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION		

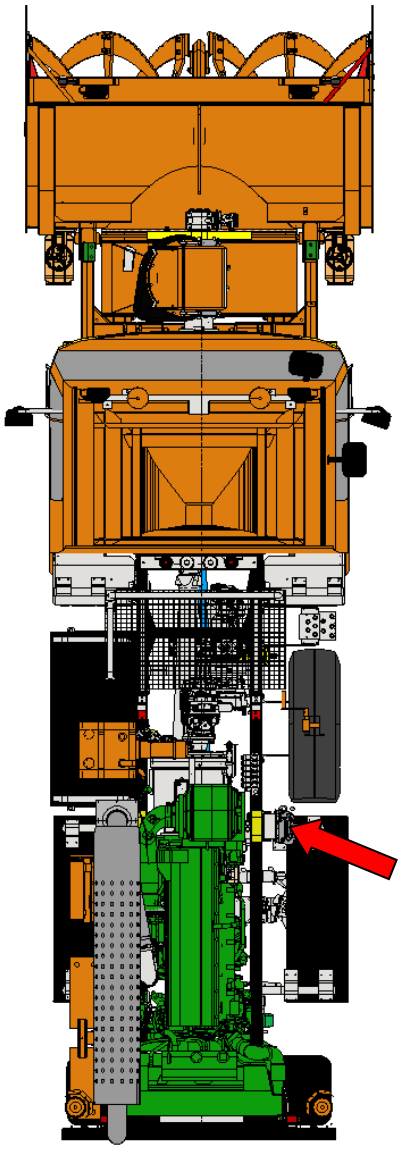
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: FUEL FILTER REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time**	15 minutes

Action points:



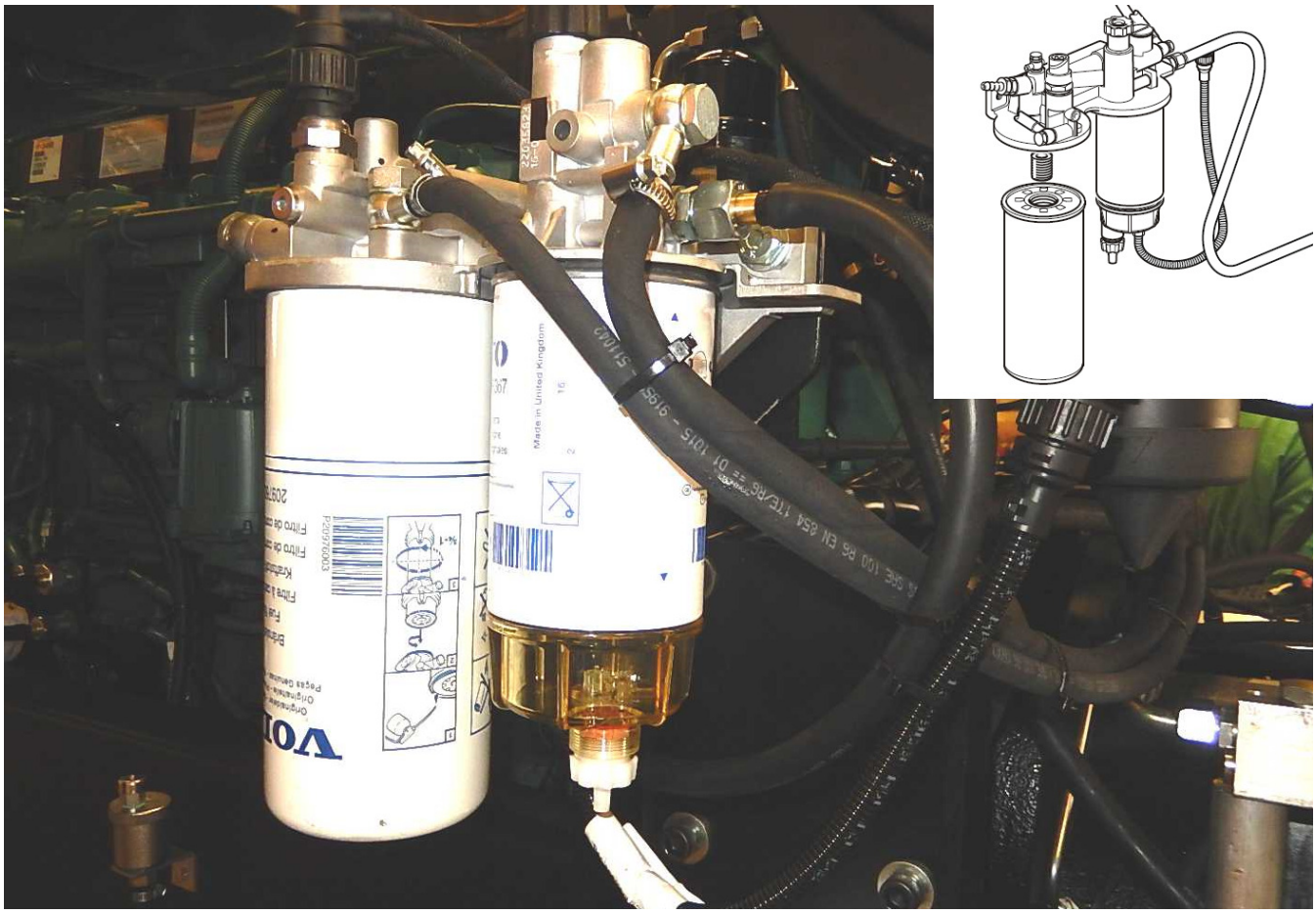
Requested spare parts:

- Fuel filter cartridge **22480372**

Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



WARNING:
Fire hazard. When carrying out work on the fuel system make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause a fire.

NOTE 1:
Do not fill the new fuel filter with fuel before assembly.
There is a risk that contamination could get into the system and cause malfunctions or damage.

a) Clean round the fuel filter.

b) Remove the filter with a suitable filter remover. Collect any spilled fuel in a collection vessel.

c) Clean the filter mating surface on the filter bracket.

d) Lubricate the seal with diesel fuel and install the new fuel filter. Tighten the fuel filter in accordance with the instructions on the fuel filter.

e) If necessary, vent the fuel system.

Bleeding the Fuel System The system does not need to be bled unless it has been run completely dry. The bleed can be done with the hand pump on the fuel filter bracket.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ■ FLUIDIC ☐ CLEANING ☐ LUBRICATION ☐ INSPECTION	**Sheet n°** **A_08**

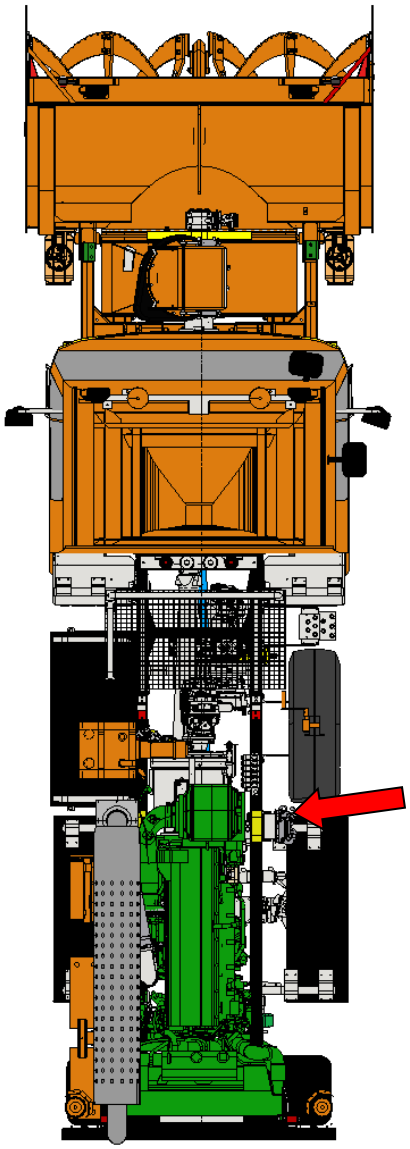
VEHICLE TYPE:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: FUEL PRE-FILTER PEPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time:**	15 minutes

Acting points:



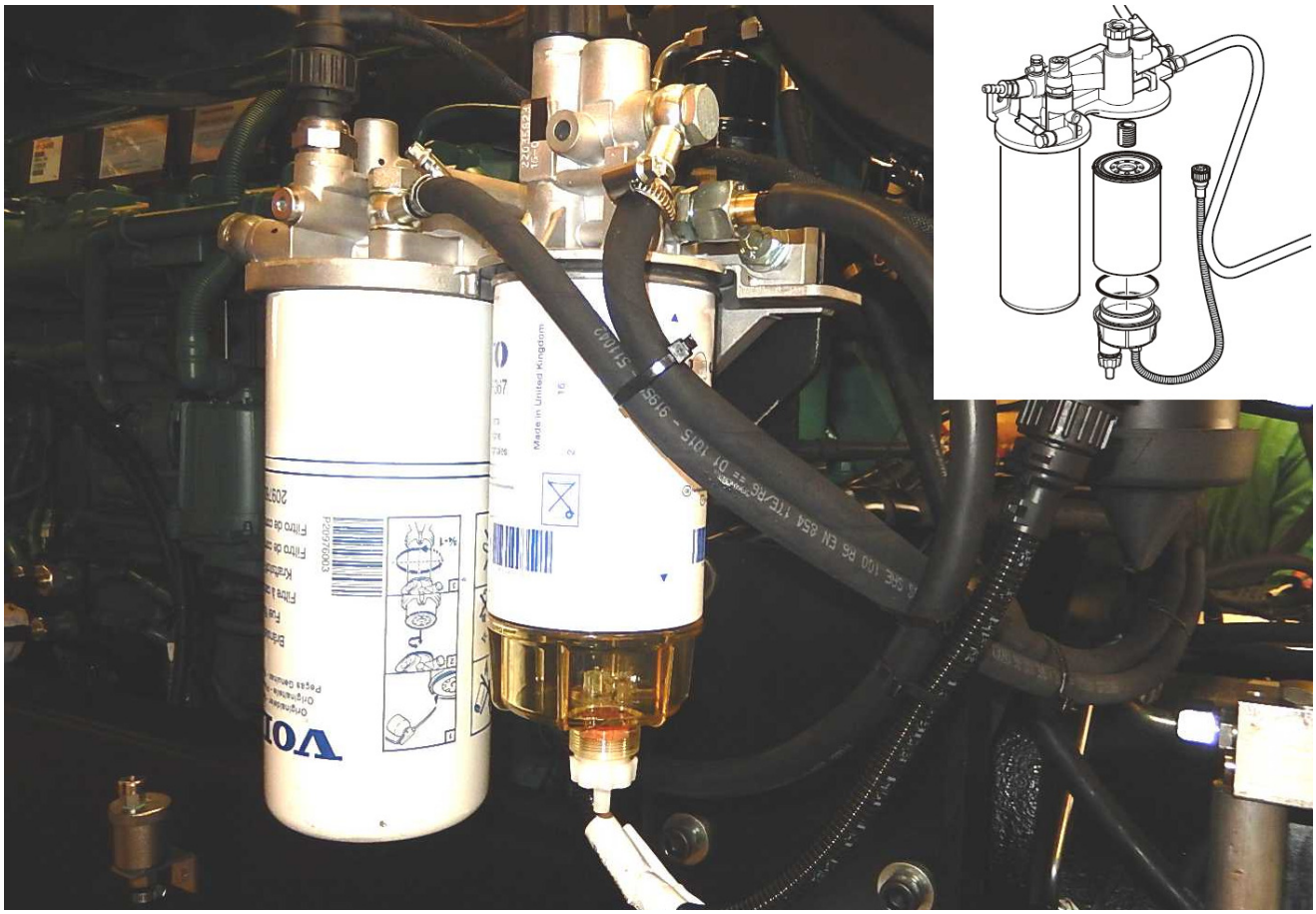
Spare parts requested:

- Fuel pre-filter cartridge code **20998367**

Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



WARNING:
Fire hazard. When carrying out work on the fuel system make sure the engine is cold. A fuel spill onto a hot surface or an electrical component can cause a fire.

a) Undo the cable from the water trap sensor.

b) Remove the water trap filter from the filter housing. Collect any spilled fuel in a container.

c) Remove the lower part of the water trap from the filter.

d) Clean the lower part of the water trap with a soft rag. Check that the drain hole in the lower part is not blocked.

e) Install a new seal on the lower part and lubricate the seal with diesel fuel. Re-install the lower part of the filter.

f) Lubricate the seal with diesel fuel. Screw the filter onto the filter bracket by hand until the rubber seal just touches the mating surface. Then tighten a further half turn, no more.

g) Connect the cable to the water trap sensor.

h) If necessary, vent the fuel system.

Bleeding the Fuel System The system does not need to be bled unless it has been run completely dry. Purging is then done with the hand pump on the fuel filter bracket.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet n°**	**A_09**
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION		

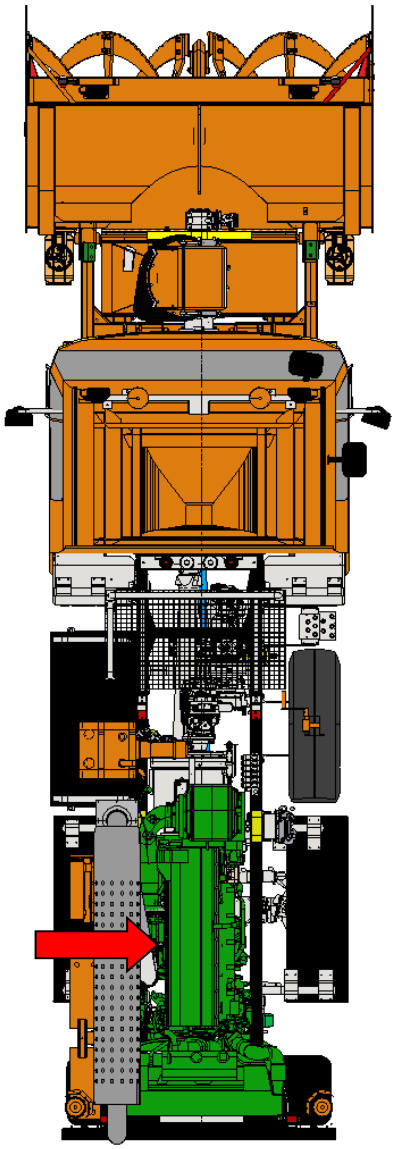
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: OIL FILTERS REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time:**	15 minutes

Action points:



Spare parts requested:

- Oil filter cartridge code **23075367 (nr. 1)**
- Oil filter cartridge code **23075366 (nr. 2)**
- Oil type **OBL LH 5W30** or equivalent.

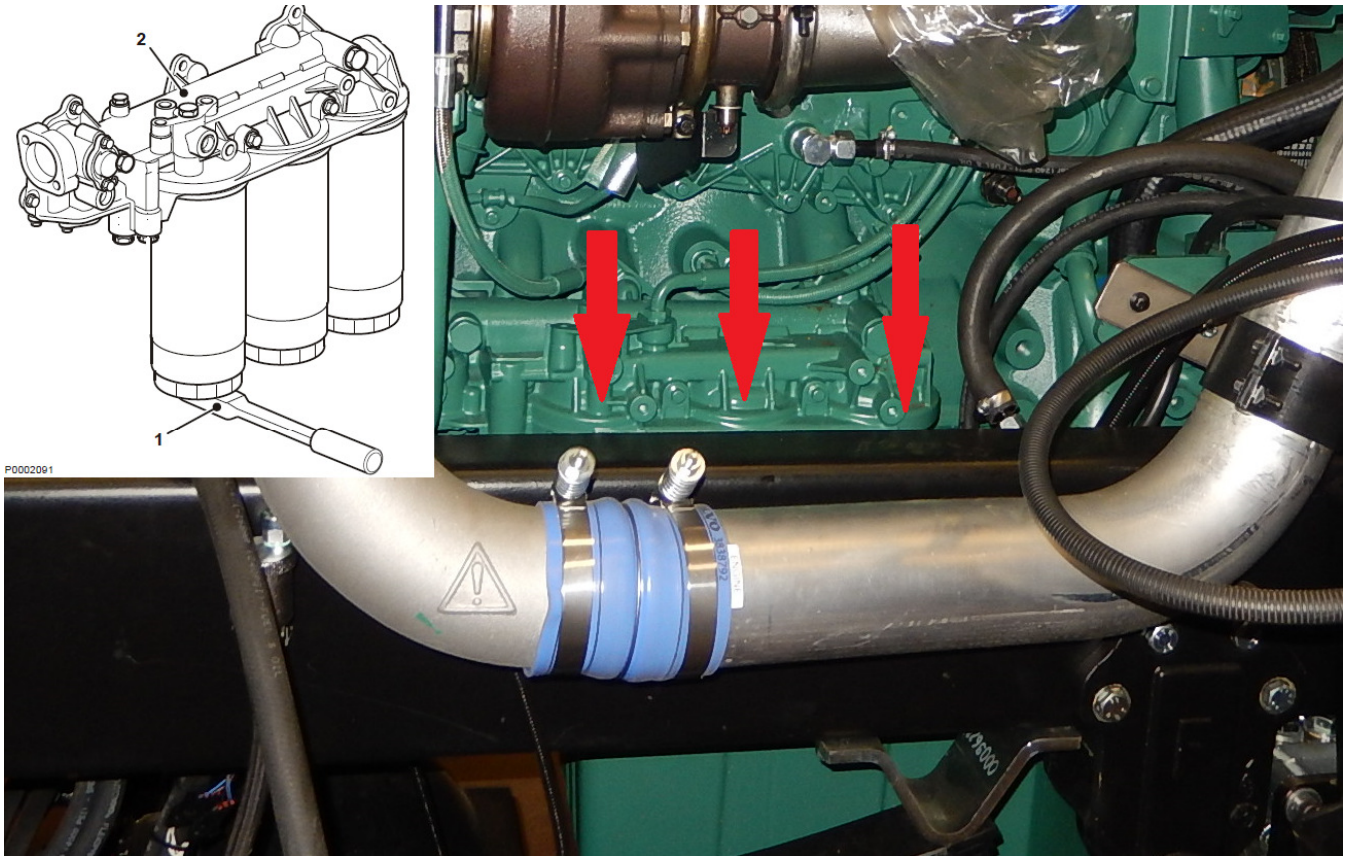
Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force

DANGER:

ACT ONLY WHEN ENGINE IS COLD. Hot oil and hot surfaces can cause burns.



a) Clean the oil filter bracket (2).

b) Remove all oil filters with a suitable oil filter extractor (1).

c) Clean the mating surface of the oil filter bracket. Make sure that no pieces of old oil seal are left behind. Carefully clean round the inside of the protective rim (2) on the oil filter bracket.

d) Put a thin layer of engine oil on the seal rings of the new fuel filters.

e) Install the new oil filters. Tighten the filters ¾–1 turn after they touch.

f) Top up with engine oil, start the engine and let it run for 20-30 seconds.

g) Turn off the engine, check the oil level and top up as required.

h) Check sealing round the oil filters.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet n°**	**A_10**
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION		

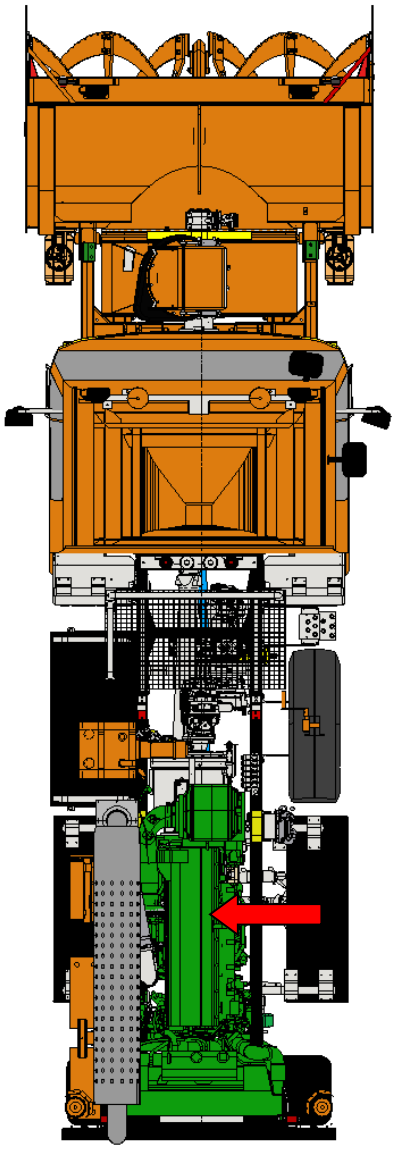
Vehicle type:	**SNOWBLOWER**	**Modello:**	**F90 STI**

Intervention type: ENGINE OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time**	30 minutes

Action points:



Requested spare parts:

- Oil type **OBL LH 5W30** or equivalent.

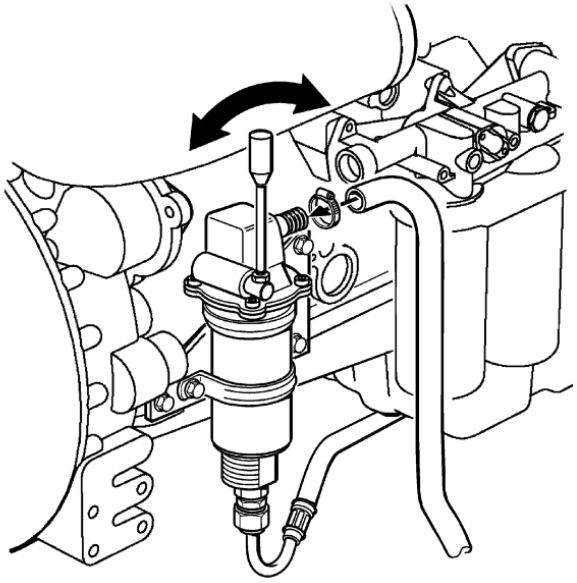
Specific tools:

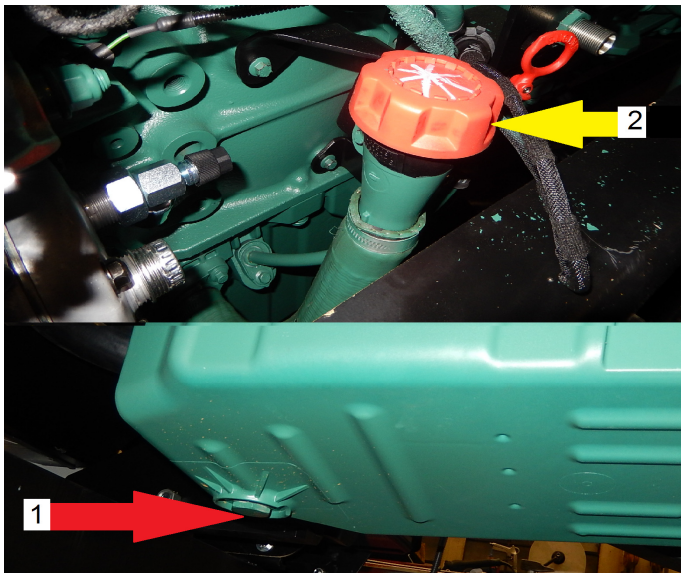
NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force

WARNING:

Operate on warm engine can cause burns.





Oil change must be done when engine is warm.

WARNING:

Warm oil flows out more quickly so be careful that this can cause burns.

a) Connect the drain hoses to the oil drain pump and check that no leakage can occur.

b) Pump the oil wasted oil out (or remove the bottom oil plug (1) and drain the oil from there) and collect it in a container.

c) Remove the drain hose (or reinstall the bottom plug (1)).

d) Fill the new engine oil through the cap (2). Check oil level as indicated on sheet 1.

NOTE

After oil replacement it is necessary to replace the oil filters as indicated in A_09.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
■	CLEANING	☐	LUBRIFICATION	☐	INSPECTION

Sheet n°

A_11

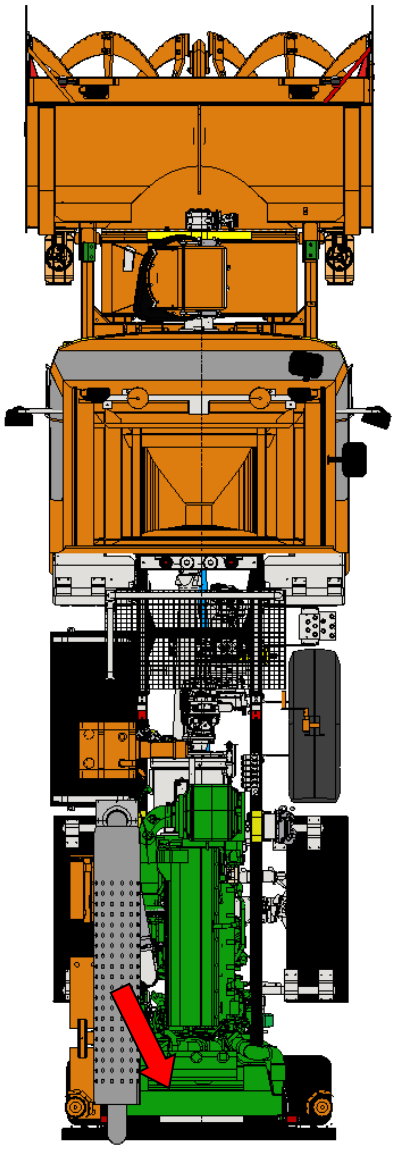
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: RADIATOR CLEANING

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time**	10 minutes

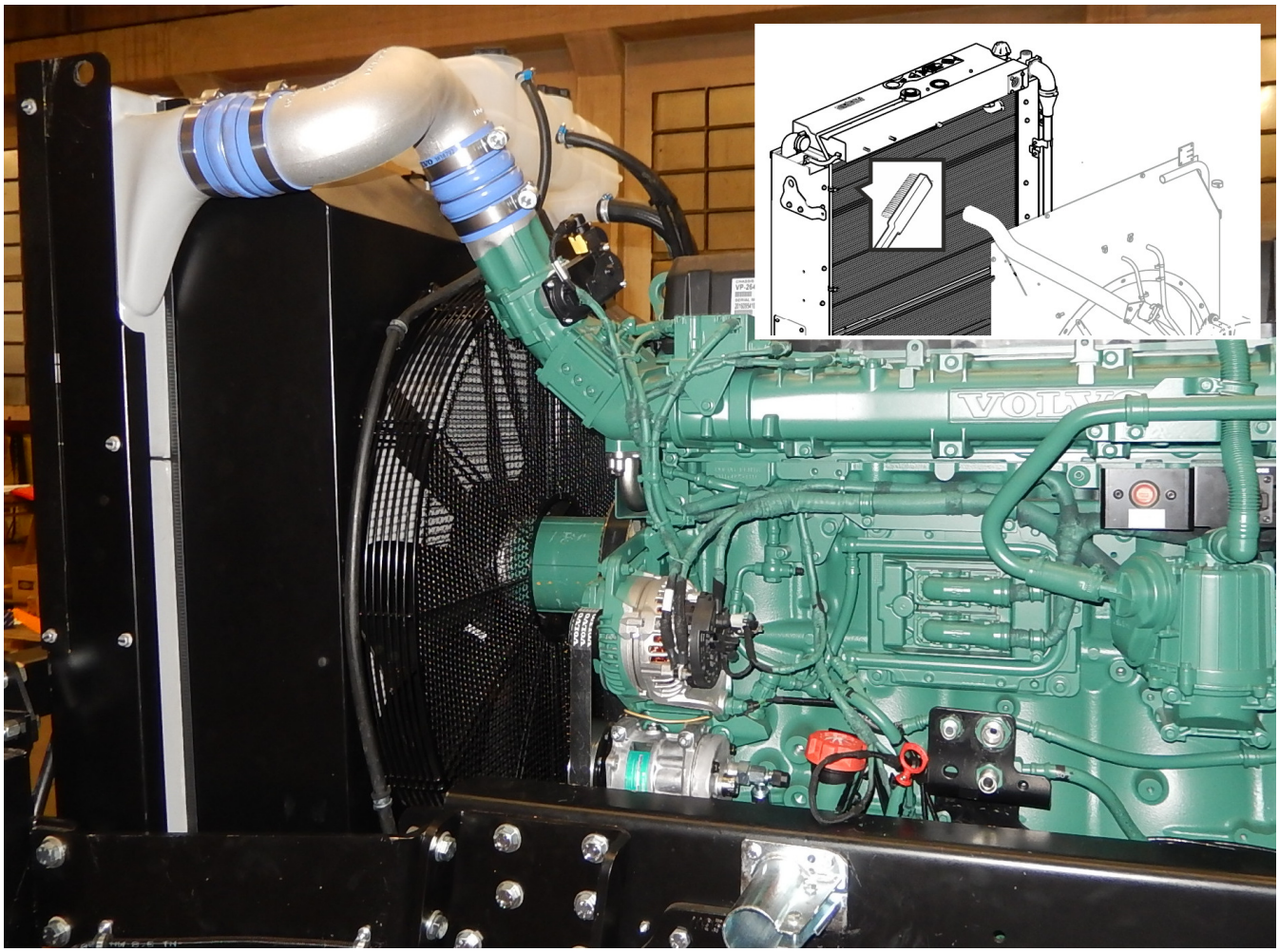
Action points:



Requested spare parts:	**Specific tools:**

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



Remove guards as necessary, to access the radiator.

Clean with water and a mild detergent. Use a soft brush. Be careful not to damage the radiator vanes.

Reinstall removed parts.

IMPORTANT!

Do not use air or water in pressure.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	PULIZIA	☐	LUBRIFICAZIONE	■	INSPECTION

Sheet n°

A_12

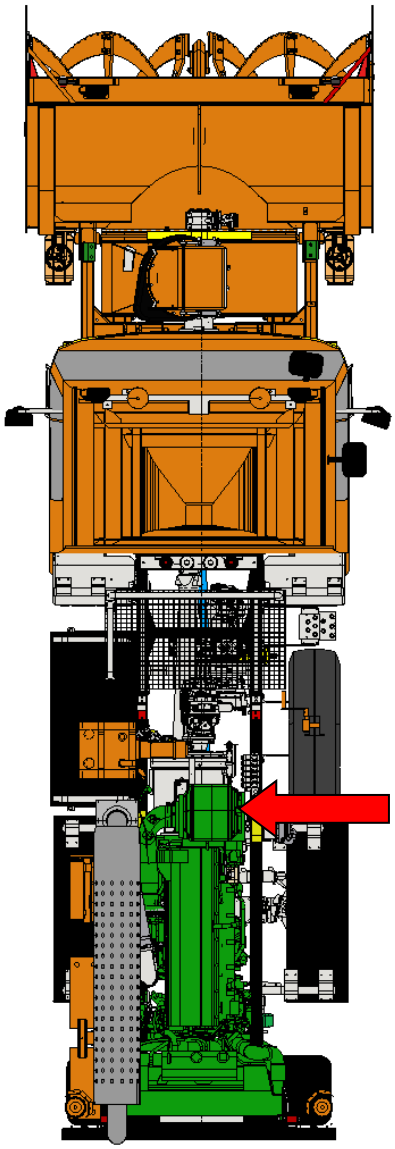
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: AIR FILTER CARTRIDGES REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS or ANUALLY	**Required time:**	15 minutes

Action points:



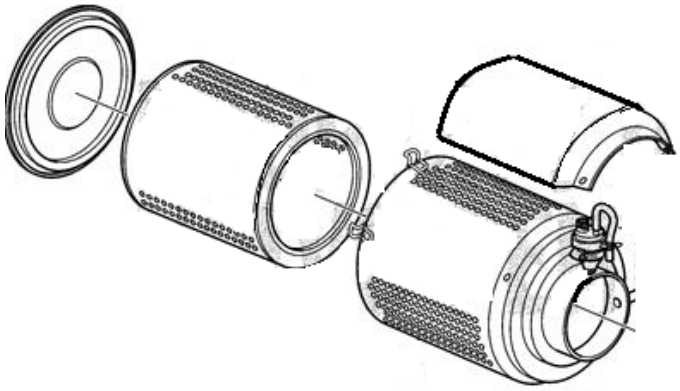
Requested spare parts:

- Main cartridge code **21702911**

Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

People operating on engine must wear protective clothes according to the regulations in force



The engine is equipped with electronic air filter indication.

The control unit provides an output signal which is announced as a warning on the instrument panel. The warning indicates a pressure drop in the air filter, which must then be checked and possibly changed.

Anyway, a filter change is requested annually.

a) Open the 6 clips (1)

b) Remove the cover (2)

c) Scrap the old filter. No cleaning or re-use is permissible.

IMPORTANT!

In continuous operation, the filter should be checked every 8 hours. For operations in extremely dirty environments such as coal mines and rock crushing mills, special air filters must be used.

NOTICE! Care for equipment and the remaining.

Maintenance sheet

☐	ELECTRIC	■	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRIFICATION	☐	INSPECTION

Sheet n°

A_13

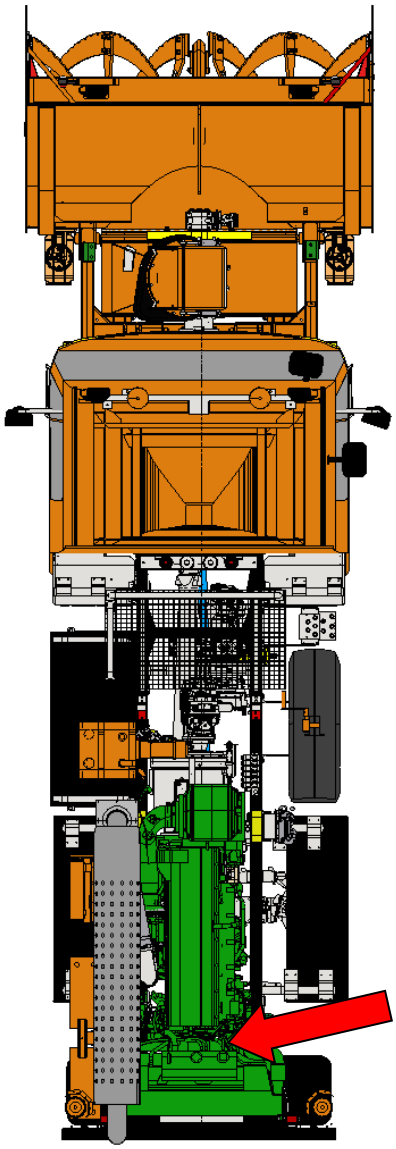
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: ENGINE BELTS REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 1250 HOURS	**Required time:**	30 minutes

Action points:



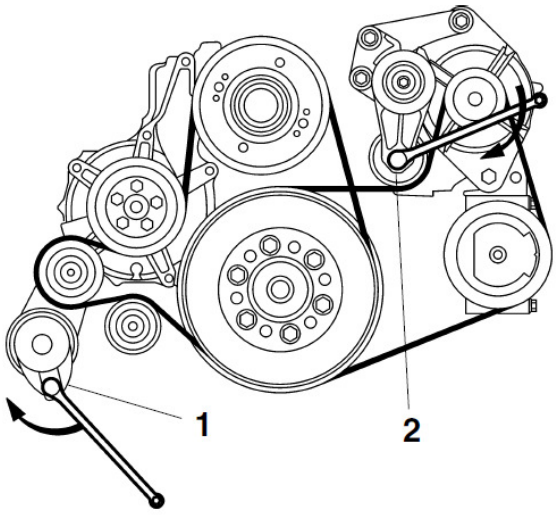
Requested spare parts:

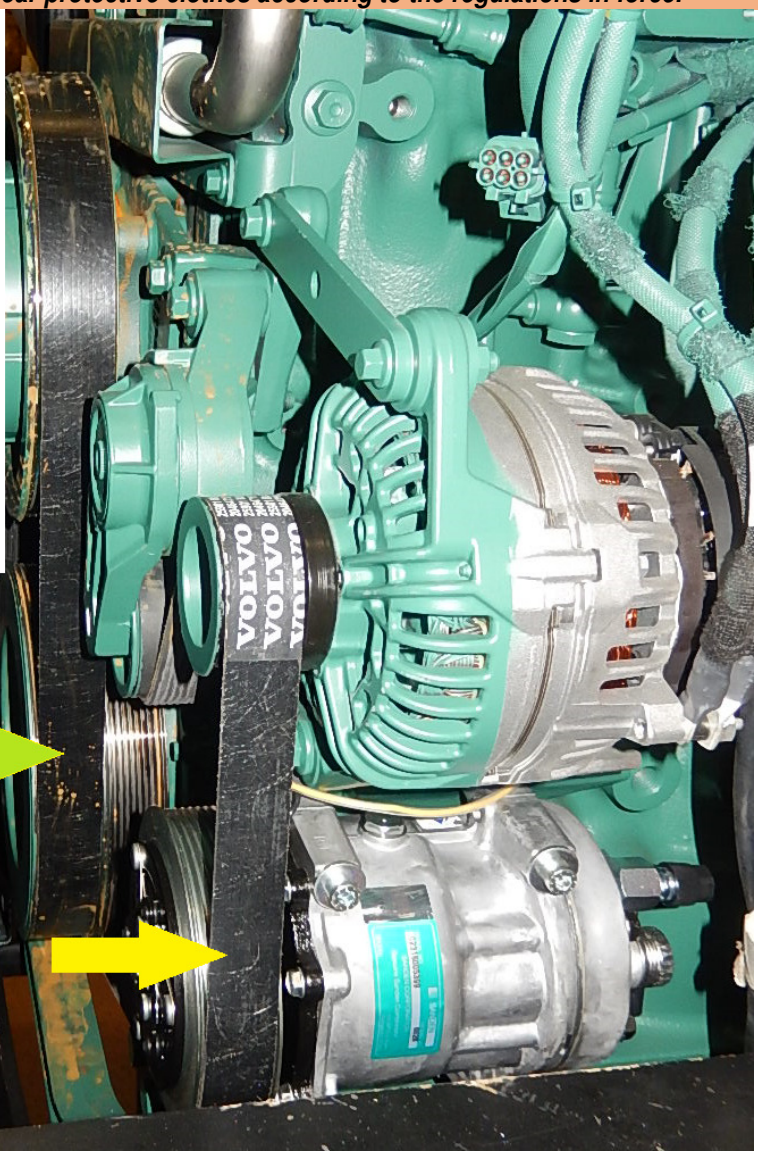
- Belt code **3838617**
- Alternator belt code **20430376**

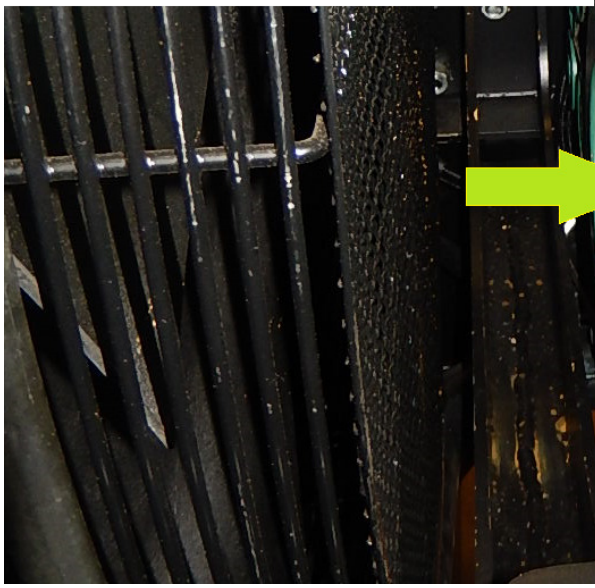
Specific tools:

NOTE: FOR MORE INFORMATION REF. TO THE OPERATOR'S MANUAL VOLVO PENTA

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.







a) Disconnect the main switch(es) and check that the engine is not connected to system voltage.
b) Remove the fan protection and the fan ring around;
c) Remove the fan guard
d) Insert a ½ square wrench in the belt tensioner (1), lift the wrench up and lift the water pump drive belt off.
e) Insert a ½ square wrench in the belt tensioner (2), press the wrench down and remove the alternator belts
f) Check that the pulleys are cleaned and undamaged
g) Press the wrench into the belt tensioner (2) down and install the new alternator drive belt.
h) Lift the wrench in the tensioner (1) up and install the new water pump drive belt.
i) Install the belts guards.
l) Install the fan ring and protection.
m) Start the engine and do a function check

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

B_01

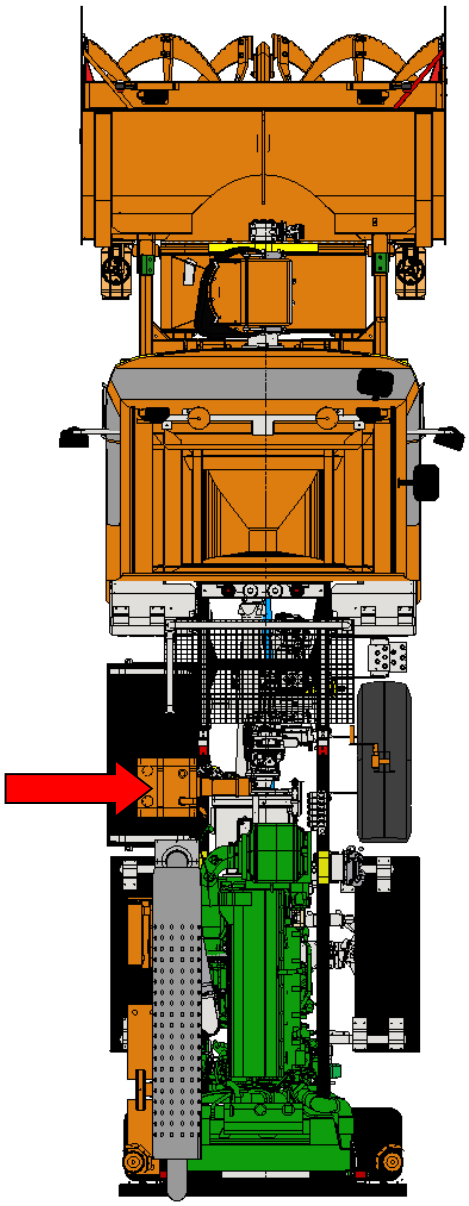
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type HYDRAULIC AND HYDROSTATIC OIL LEVEL CHECK

ENGINE	**HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM**	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time:**	1 minute

Action points:



Requested spare parts:

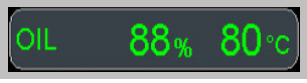
- Oil type **TUTELA CAR GI/E** or equivalent.

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

NOTE:

An indicator light indicates 

quantity and temperature..

a) Check on control panel the tank oil level. If it is lower than **80%** proceed as following.

b) Fill the new oil through the upper plug (1).

WARNING:

The correct level is about 10 cm from the top of the tank.

The check must be done with cold oil.

WARNING:

Use only TUTELA CAR GI/E or equivalent.

The oil has to be filtered in a 10 micron.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet n°**	
☐	CLEANING	☐	LUBRIFICATION	☐	INSPECTION	**B_02**	

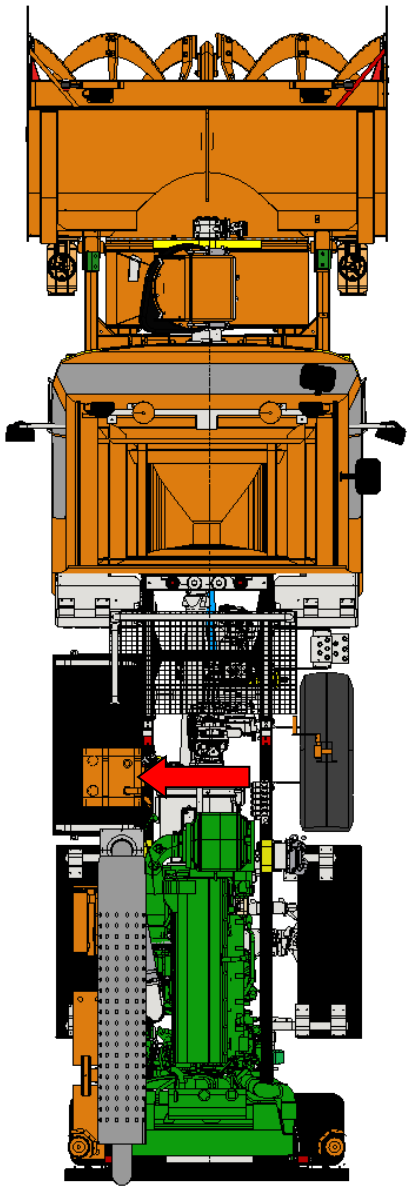
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: HYDROSTATIC TRANSMISSION OIL FILTER REPLACEMENT

ENGINE	**HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM**	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time:**	20 minutes

Action points:



Requested spare parts:

Filter cartridge code **00099792**

Oil type **TUTELA CAR GI/E** or equivalent

Specific tools:

PROCEDURE

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.

a) Put a container under the oil filter

b) Remove the plastic cover.

c) Remove the old filter and install the new one.

d) Reinstall the cover.

e) Run the engine and make sure there are no leaks.

WARNING:

As soon as the filter is removed, the oil becomes flowing out. At the end of the operation it's necessary to fill the tank at the correct oil level.

Use only TUTELA CAR GI/E oil or equivalent.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION

Sheet n°

B_03

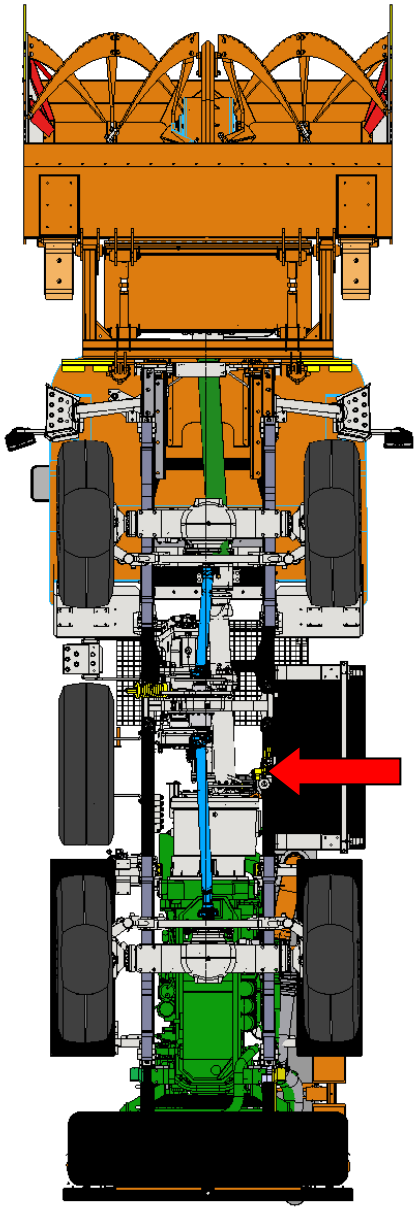
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention points: HYDRAULIC OIL FILTER REPLACEMENT

ENGINE	**HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM**	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time:**	20 minutes

Action points:



Requested spare parts:

- Cartridge code **00083031**
- Oil type **TUTELA CAR GI/E** or equivalent.

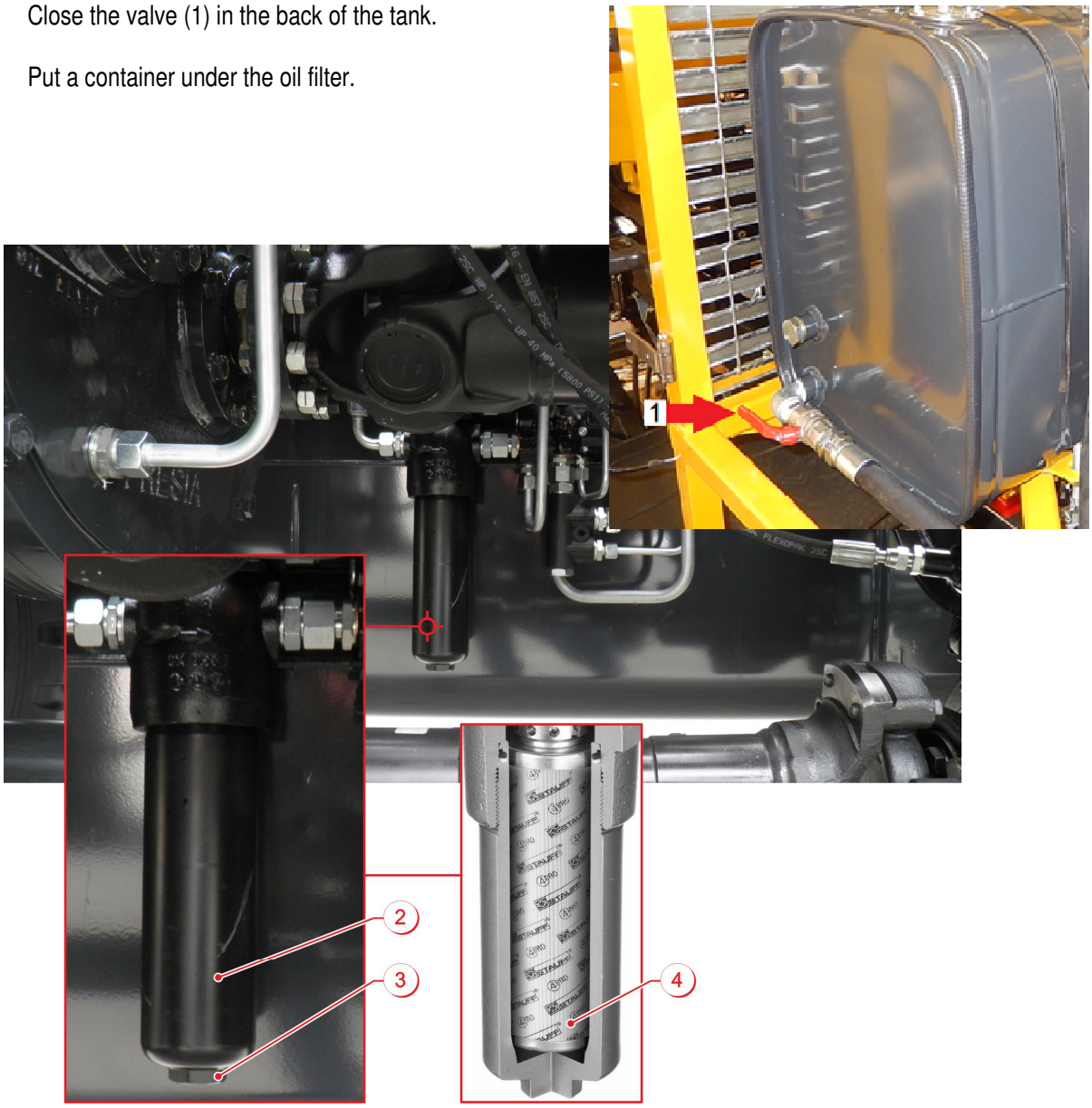
Specific tools:

PROCEDURE:

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.

a) Close the valve (1) in the back of the tank.

b) Put a container under the oil filter.



a) Remove the housing (2) by unscrewing the nut (3).

b) Slide out the cartridge (4)

c) Insert the new one.

d) Fix back the housing (2) screwing the nut (3).

e) Open the valve (1).

WARNING:
At the end of the operation, it is necessary to refill the tank at the correct level.
Use only TUTELA CAR G1/E oil or equivalent.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION

Sheet n°

B_04

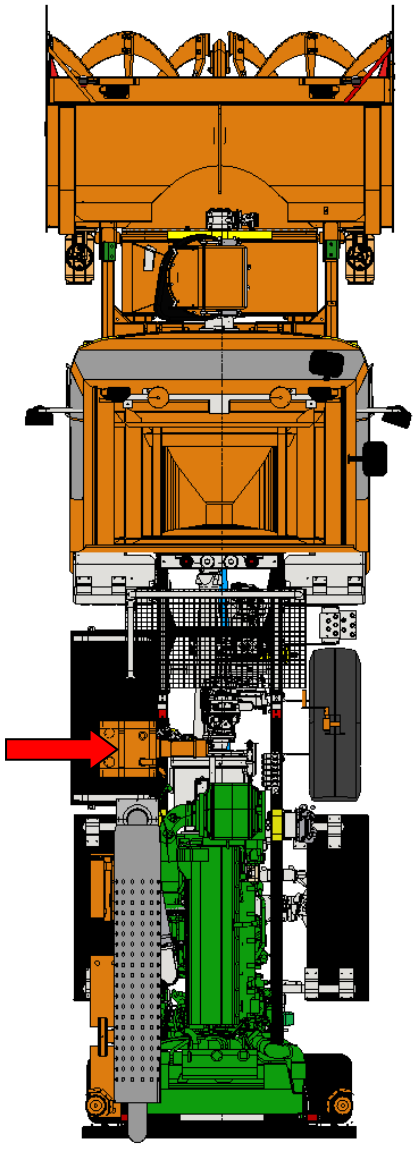
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: HYDRAULIC AND HYDROSTATIC OIL REPLACEMENT

ENGINE	**HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM**	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 1000 HOURS (2 YEARS)	**Required time:**	30 minutes

Action points:



Requested spare parts:

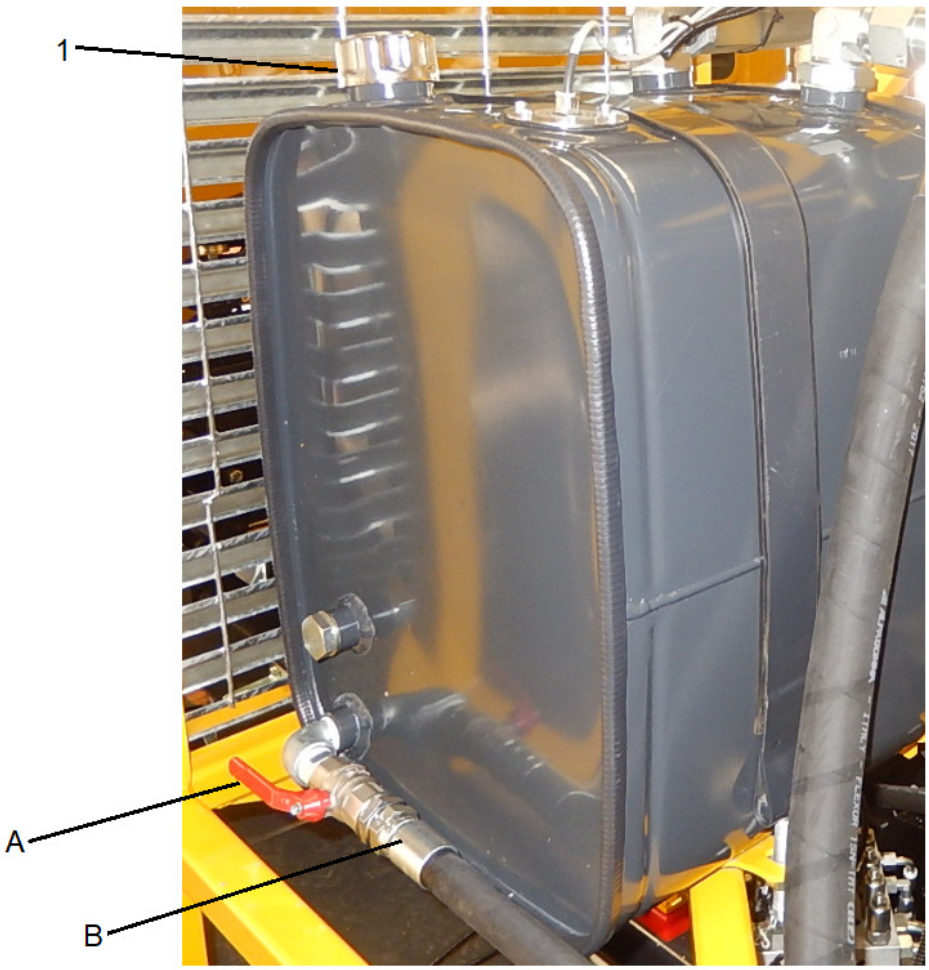
- Oil type **TUTELA CAR GI/E** or equivalent.

Specific tools:

- Suction pump

PROCEDURE:

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.



a) Unscrew the plug (1).

b) Remove the oil from the tank using a suction pump or proceed as following:

- ✓ close the valve A;
- ✓ disconnect hose B of aspiration pump;
- ✓ put a container under the valve;
- ✓ open the valve A;
- ✓ when the tank is empty, close A and connect the hose B;

c) Fill the tank with new oil through the opening until it reaches 10 cm from the top;

d) Screw back the tank plug (1).

WARNING:
Use only TUTELA CAR GI/E oil or equivalent.
Oil must be filtered in a 10 micron.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **C_01**

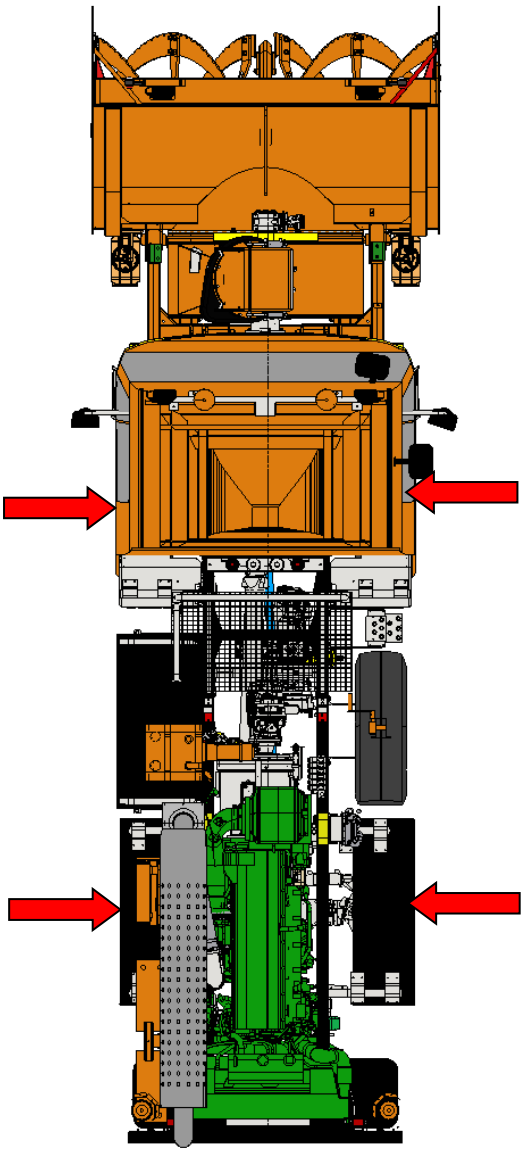
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: WHEEL HUBS OIL LEVEL CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	**AXLES**	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	30 minutes

Action points:



Requested spare parts:	**Specific tools:**
• Oil type **TUTELA W90/M-DA** or equivalent.	

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

a) Unscrew the plug (1) and check that the oil reaches “OIL LEVEL”(2).

b) If the level is too low, fill oil through the opening (1).

c) Screw back the plug (1).

d) Repeat the operation for each hub.

WARNING:

Do not overfill!

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **C_02**

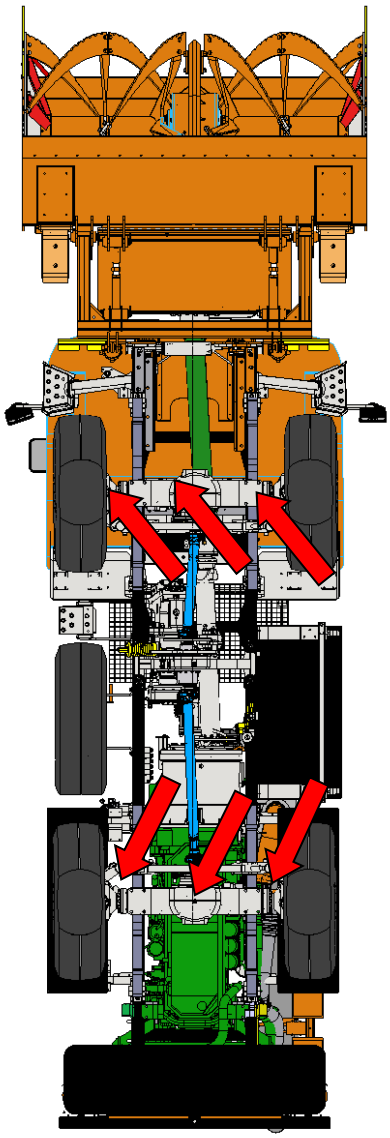
Vehicle type	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: DIFFERENTIAL OIL CHECK AND STEERING HEAD GREASING

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time**	20 minutes

Action points:



Requested spare parts:	**Specific tools:**
• Oil type **TUTELA W90/M-DA** or equivalent.	

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

a) Drive the vehicle on an inspection pit.

b) Unscrew the plug (1) and check that the level reaches the lower part of the opening.

c) If it is necessary, refill.

d) Screw back the plug (1).

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **C_03**

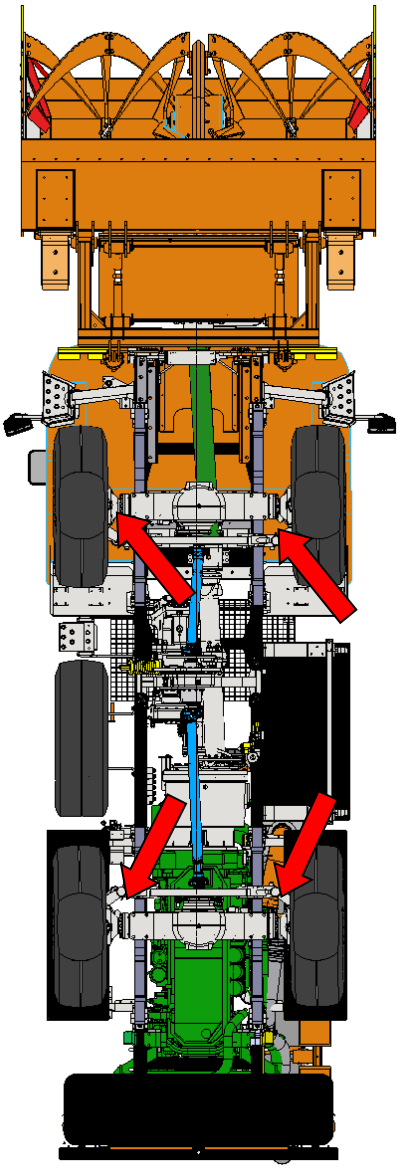
Vehicle type	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type:	LUBRICATE AXLE ARTICULATIONS, STEERING CYLINDER, SHACKLE BAR AND TRANSMISSION SHAFTS

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	**AXLES**	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time**	10 minutes

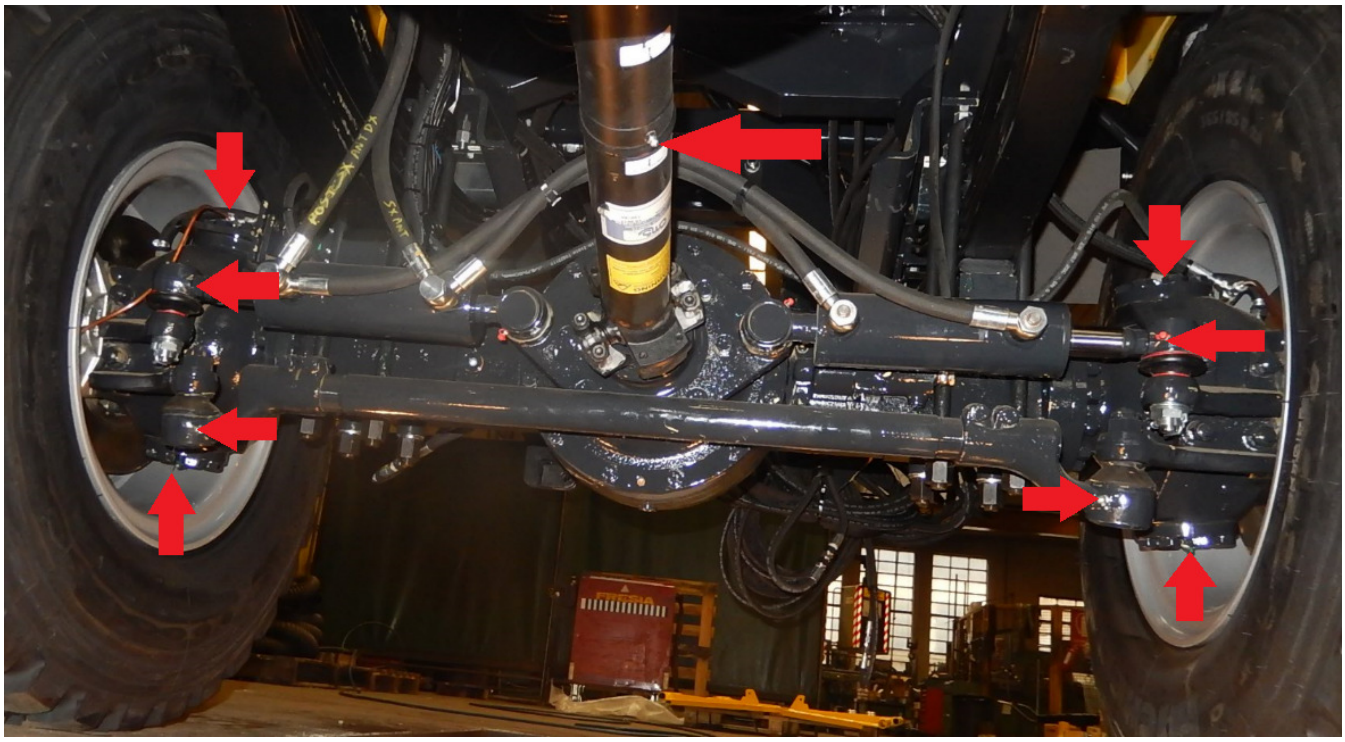
Action points:



Requested spare parts:	**Specific tools:**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



NOTE:
Inject grease into the grease fittings on steering cylinders and coupling bar (2)(4 grease fittings each axle) and in steering articulation (3) (nr.6 grease fittings each axle) and transmission shafts (n.1 fitting for each).

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet n°**	
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION	**C_04**	

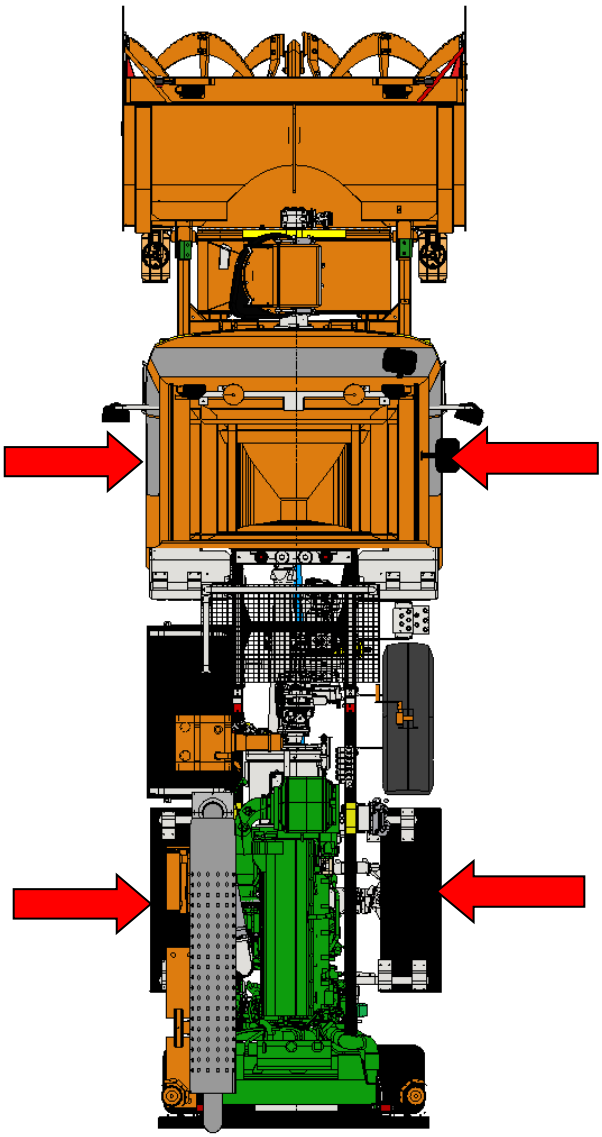
Vehcile type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: HUBS OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS (1 YEAR)	**Required time:**	60 minutes

Action points:



Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.
- Seals for plugs (1) and (2) code **R0082099**

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

NOTE:
It is suggested to do the operation with warm oil to make its flowing out easier.

a) Move the vehicle to have the hub in position like in picture.

b) Put a container under hub.

c) Unscrew plugs (1) and (2) and let all the oil flowing out.

d) Screw back the plug (2) (replace plug (2) gasket).

e) Fill the hub with new oil through the opening (1) till it reaches “OIL LEVEL”(3). The filling should be done slowly to allow the oil to penetrate into the gears.

f) Screw back the plug (1) (replace (1) gasket).

WARNING:
Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ■ FLUIDIC ☐ CLEANING ☐ LUBRICATION ☐ INSPECTION	**Sheet n°** **C_05**

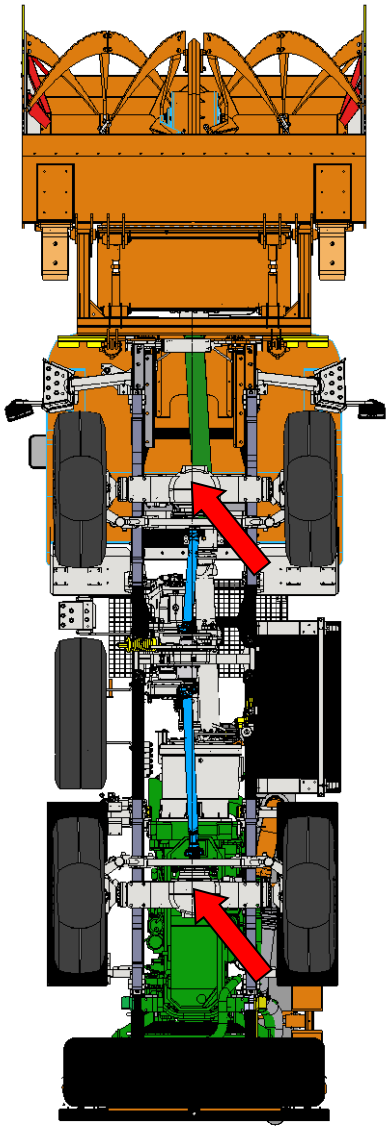
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: DIFFERENTIAL OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS (1 YEAR)	**Time required:**	60 minutes

Action points:



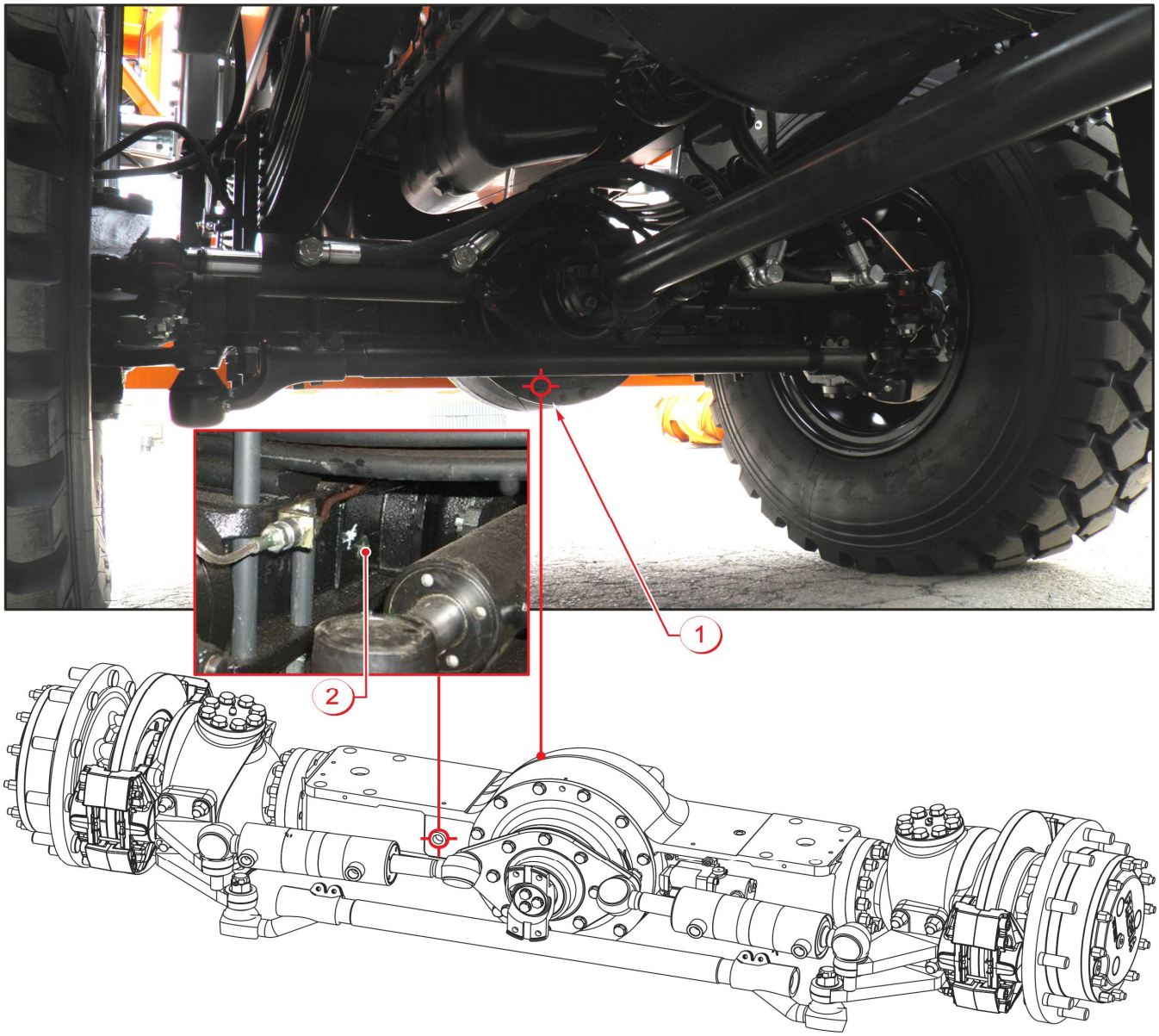
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.
- Plug gaskets (1) and (2) code **R0082099**

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Move the vehicle over an inspection pit.

b) Put a container under the differential.

c) Unscrew the plug (1) and let the oil flows out.

d) Screw back the plug (1) (replace the gasket (1)).

e) Fill new oil through the opening (2) till it reaches the lower part of the opening (replace gasket (2));

f) Screw back plug (2).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	Maintenance sheet	Sheet n°
	☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	C_06

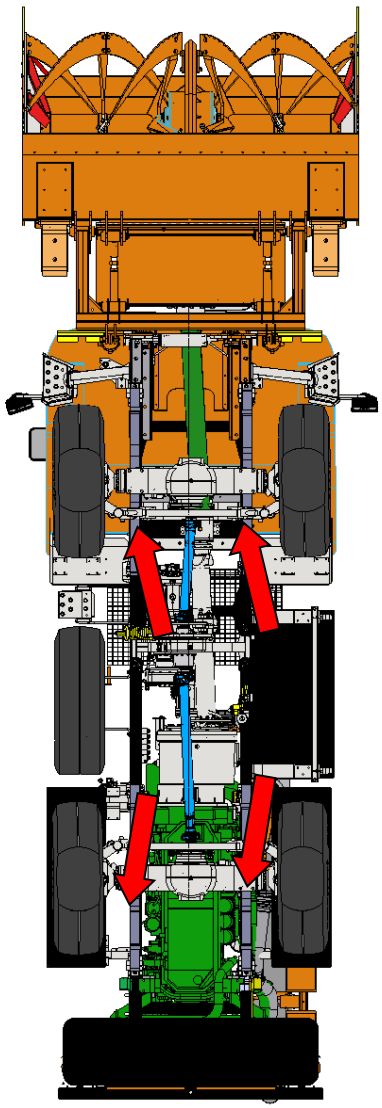
Vehicle type:	SNOWBLOWER	Model:	F90 STI

Intervention type: CHECK THE STEERING HEADS AND SHACKLE BAR HEADS CLEARANCE

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS (1 YEAR)	Required time:	20 minutes

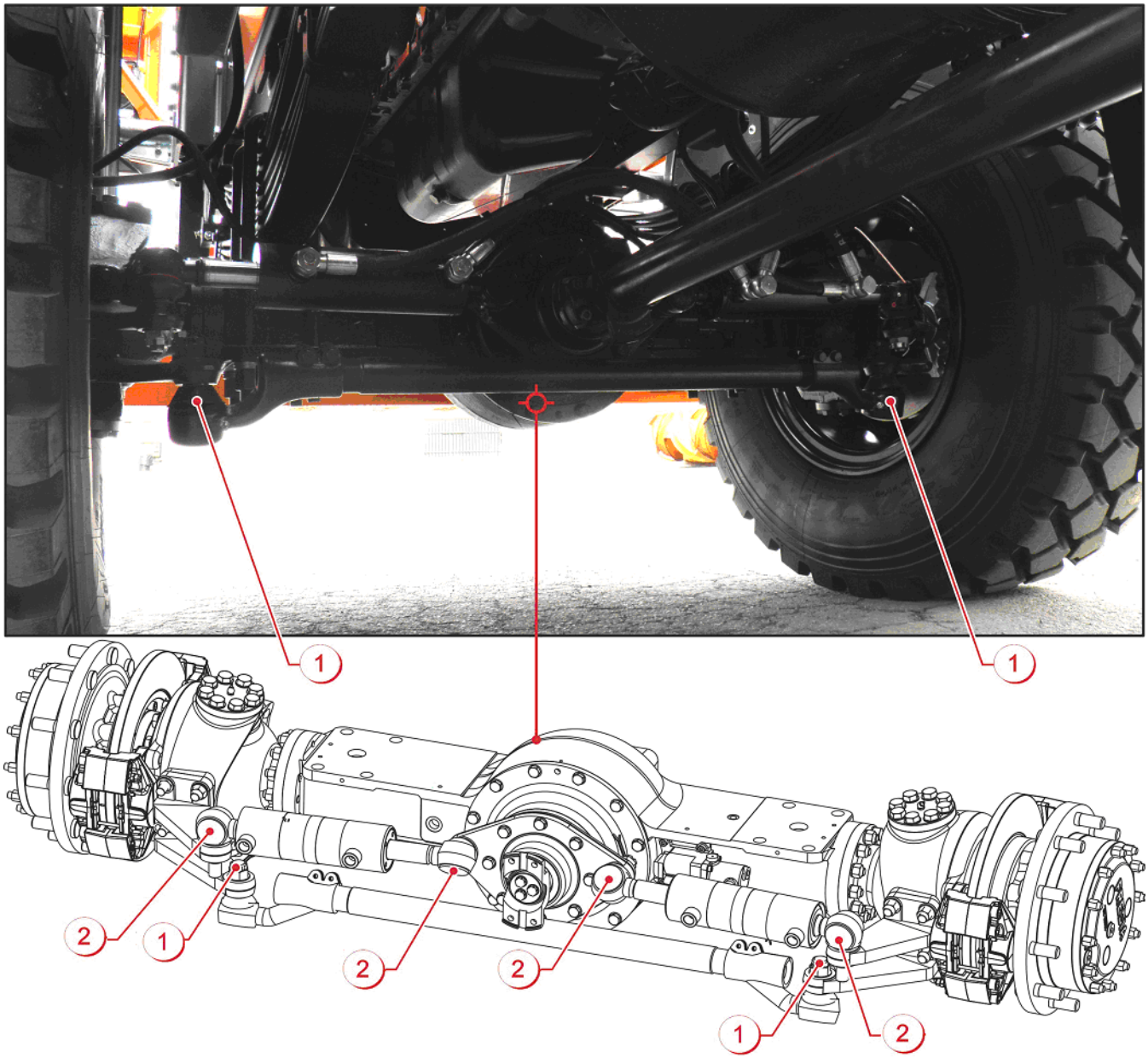
Action points:



Requested spare parts:	Specific tools:

PROCEDURE:

> ***People operating on engine must wear protective clothes according to the regulations in force***



a) Check the coupling bar heads (1), and the heads of steering cylinders (2) have no gaps.

b) If it is necessary, replace them.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANICA ☐ FLUIDIC ☐ CLEANING ■ LUBRICATION ☐ INSPECTION	**Sheet n°** **D_01**

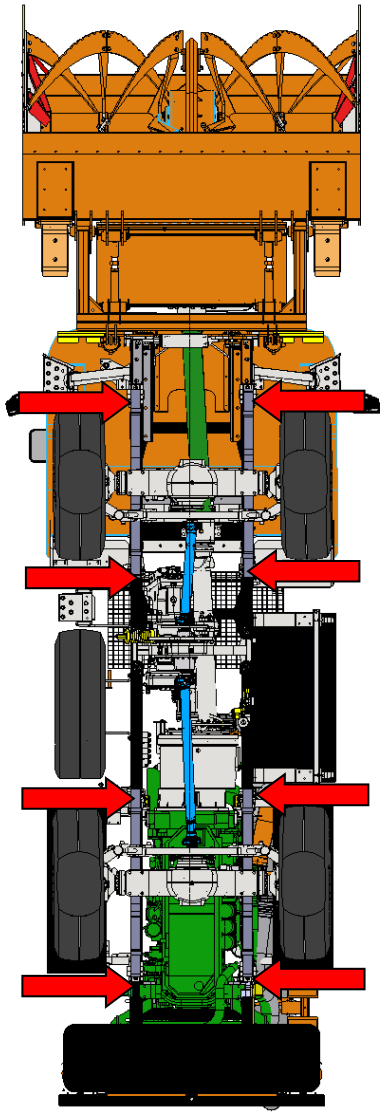
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 F90 STI**

Intervention type: SUSPENSION LUBRICATION

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	**SUSPENSIONS**
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	15 minutes

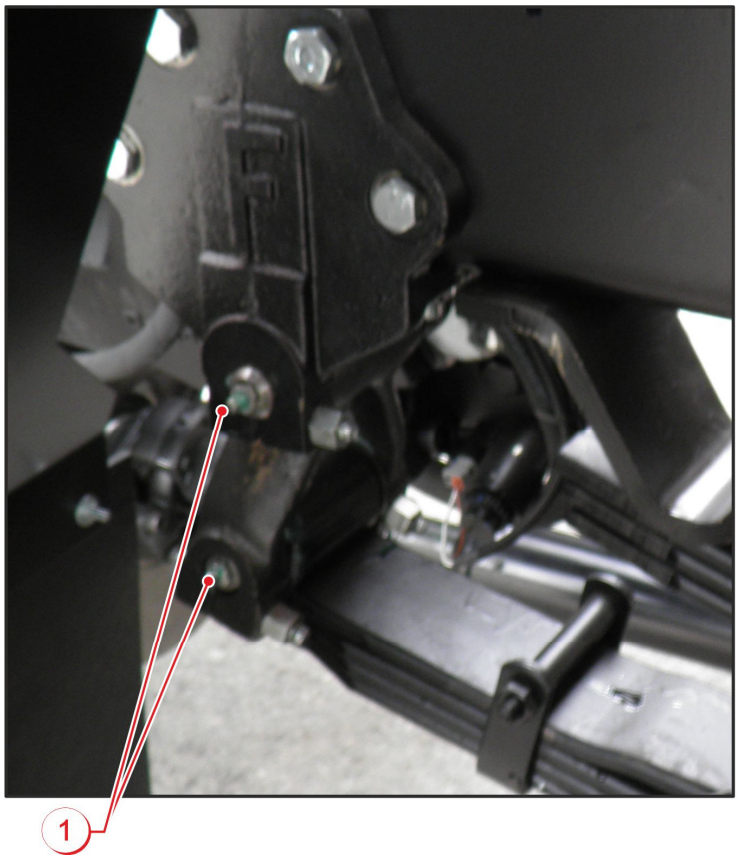
Action points:

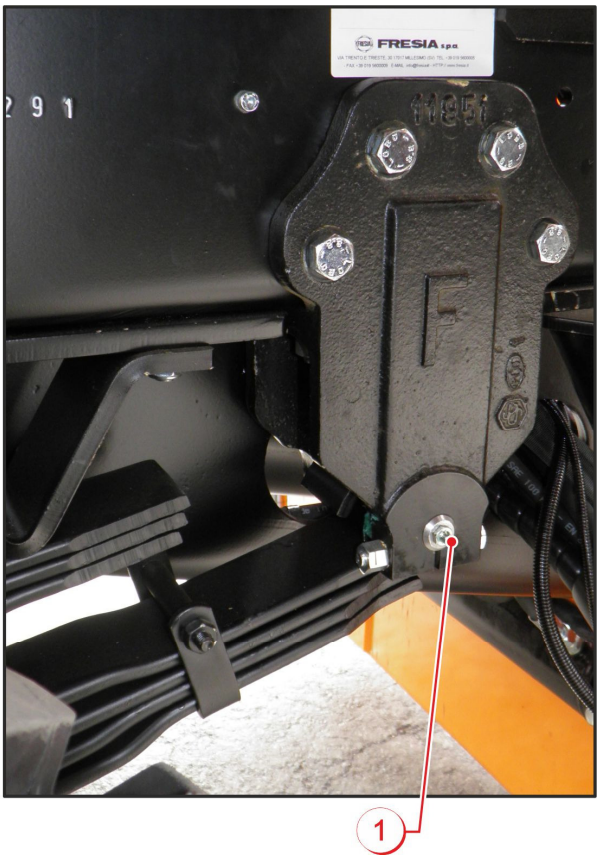


Requested spare parts:	**Specific tools:**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force





NOTE:

Inject grease into the fittings (1) of the leaf springs (nr. 3 each leaf spring –nr. 12 in total).

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **D_02**

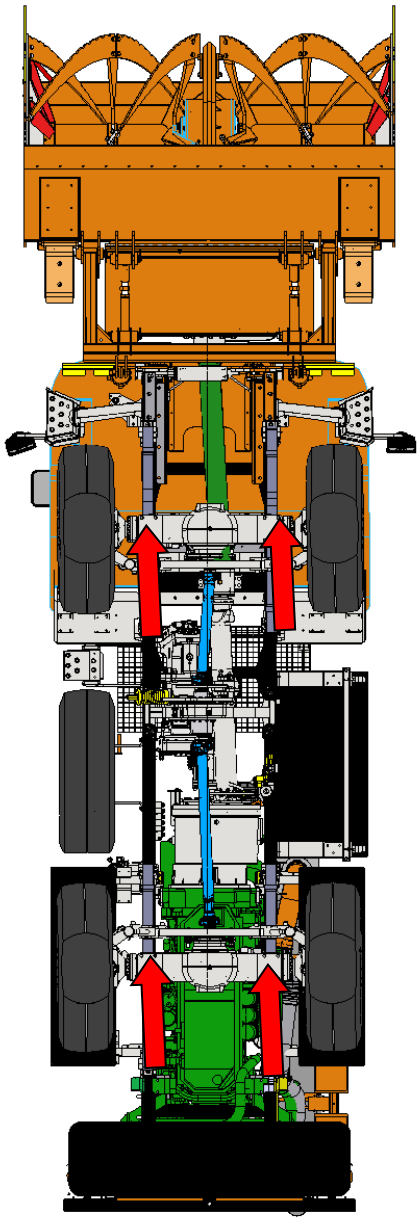
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 F90 STI**

Intervention type: CHECK THE TOQUE OF NUTS CONNECTING AXLES TO THE LEAF SPRINGS

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 250 HOURS	**Required time:**	10 minutes

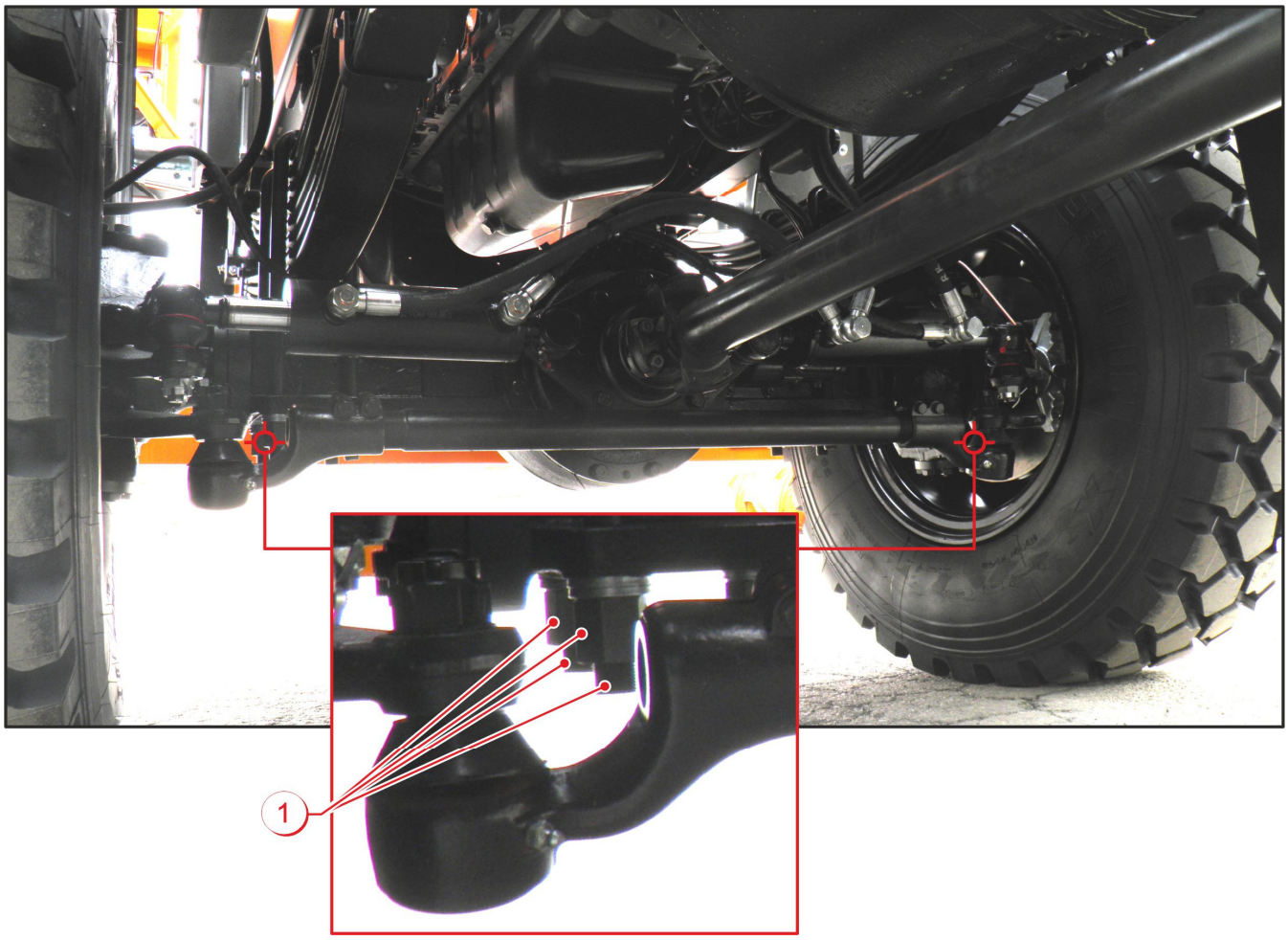
Action points:



Requested spare parts:	**Specific tools:**

PROCEDURE:

> ***People operating on engine must wear protective clothes according to the regulations in force***



a) Check the torque of nut for connection of the axle to the leaf spring (1) (nr. 8 nut each axle).

Recommended torque: **500 Nm**

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

E_01

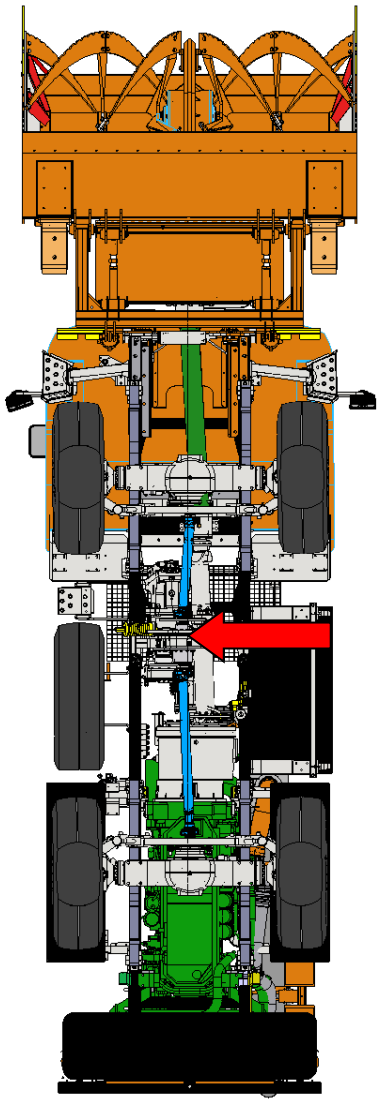
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: TRANSFER REDUCER OIL LEVEL CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	**TRANSFER REDUCER**	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time**	10 minutes

Action points:



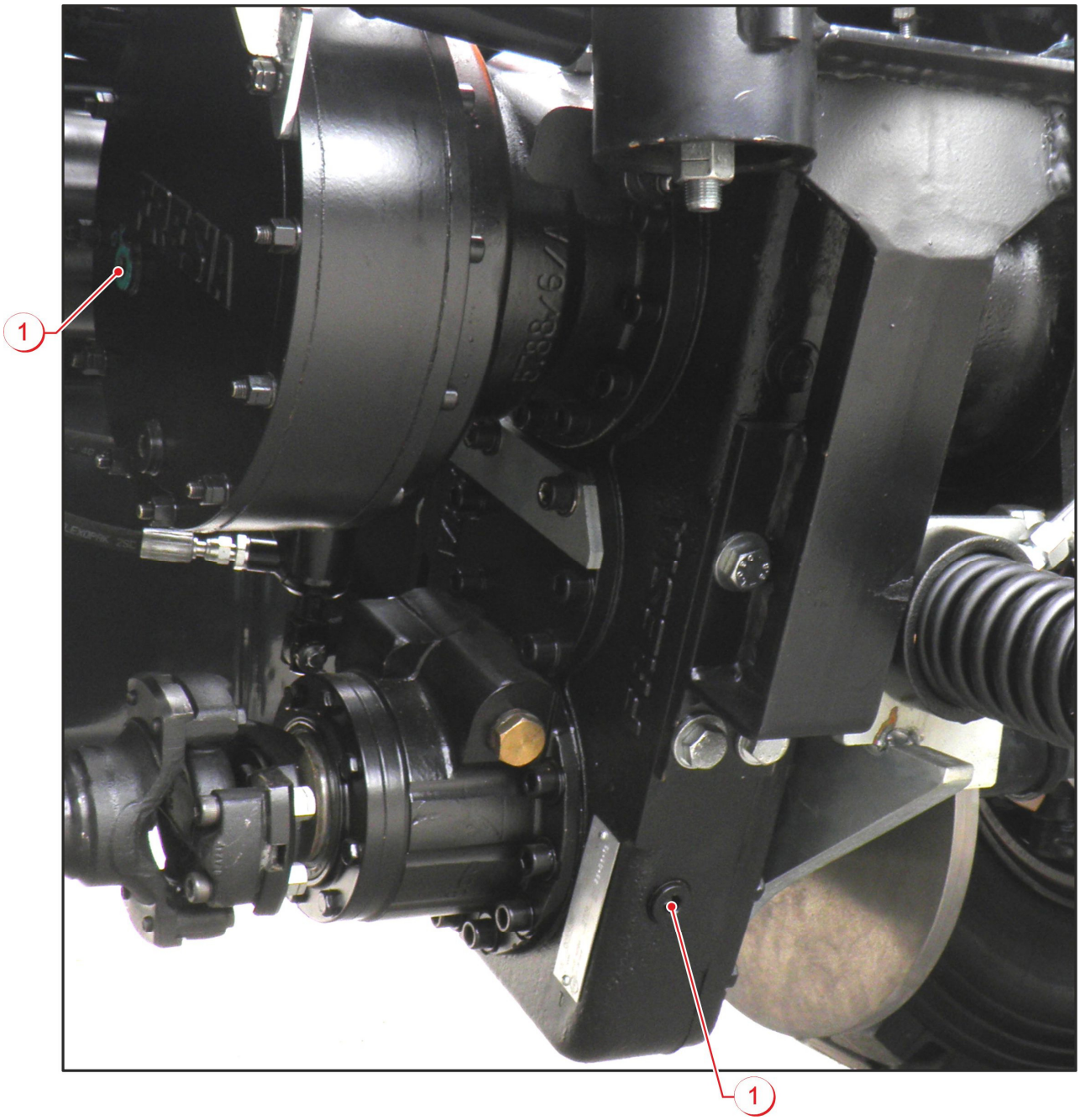
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Move the vehicle over an inspection pit.

b) Unscrew the plugs (1) and check that the oil reaches the low parts of the openings.

c) If it is necessary refill through the openings.

d) Screw back the plugs (1).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION

Sheet n°

E_02

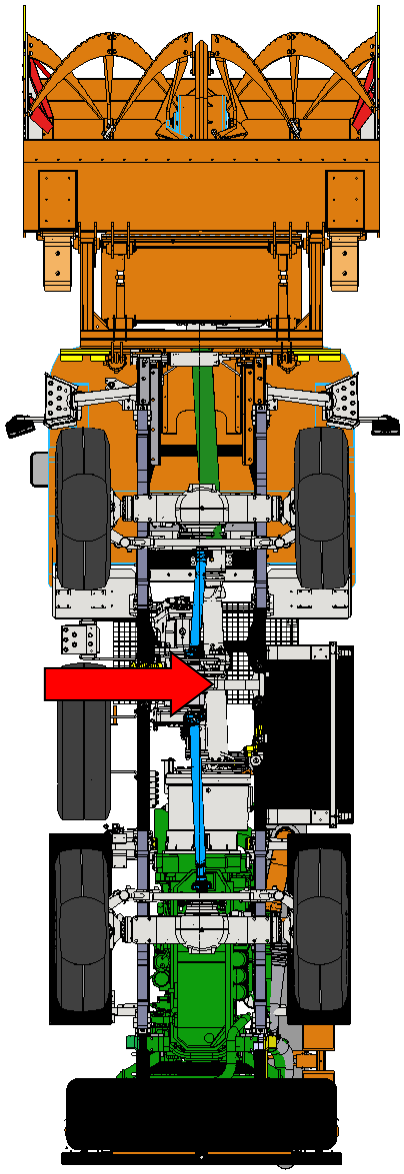
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: TRANSFER REDUCER OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	**TRANSFER REDUCER**	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS (1 YEAR)	**Required time:**	30 minutes

Action points:



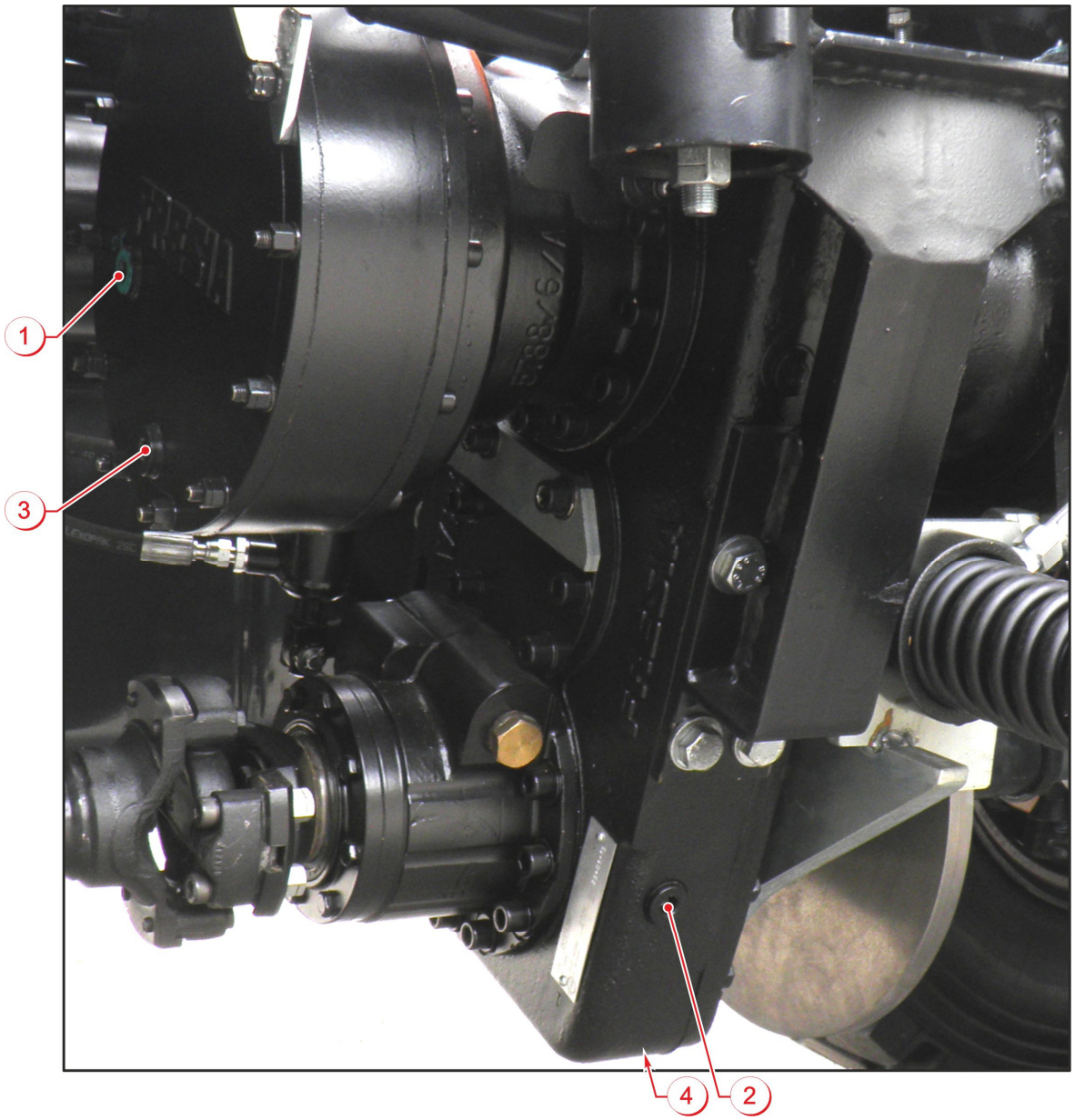
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent
- Plug gaskets (2) (4) code **R0082099**
- Plug gaskets (1) (3) code **R1012552**

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Move the vehicle over an inspection pit.

b) Put a container under the transfer reducer.

c) Unscrew the plugs (1), (2), (3) and (4), let the oil drains out.

d) Screw back the plugs (3) and (4) (replace (3) and (4) gaskets).

e) Pour new oil through the openings (1) and (2) to reach the correct level.

f) Screw back the plugs (1) and (2) (replace (1) and (2) gaskets).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

F_01

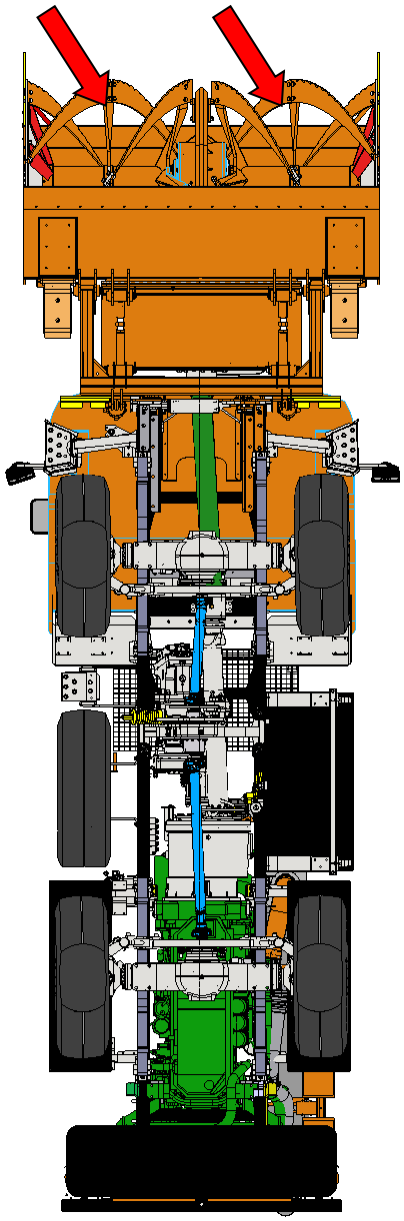
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: BLOWER HEAD BLADE WEARING CHECK

ENGINE	HYDROSTATIC TRANSMISSIONA & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time**	5 minutes

Action points:



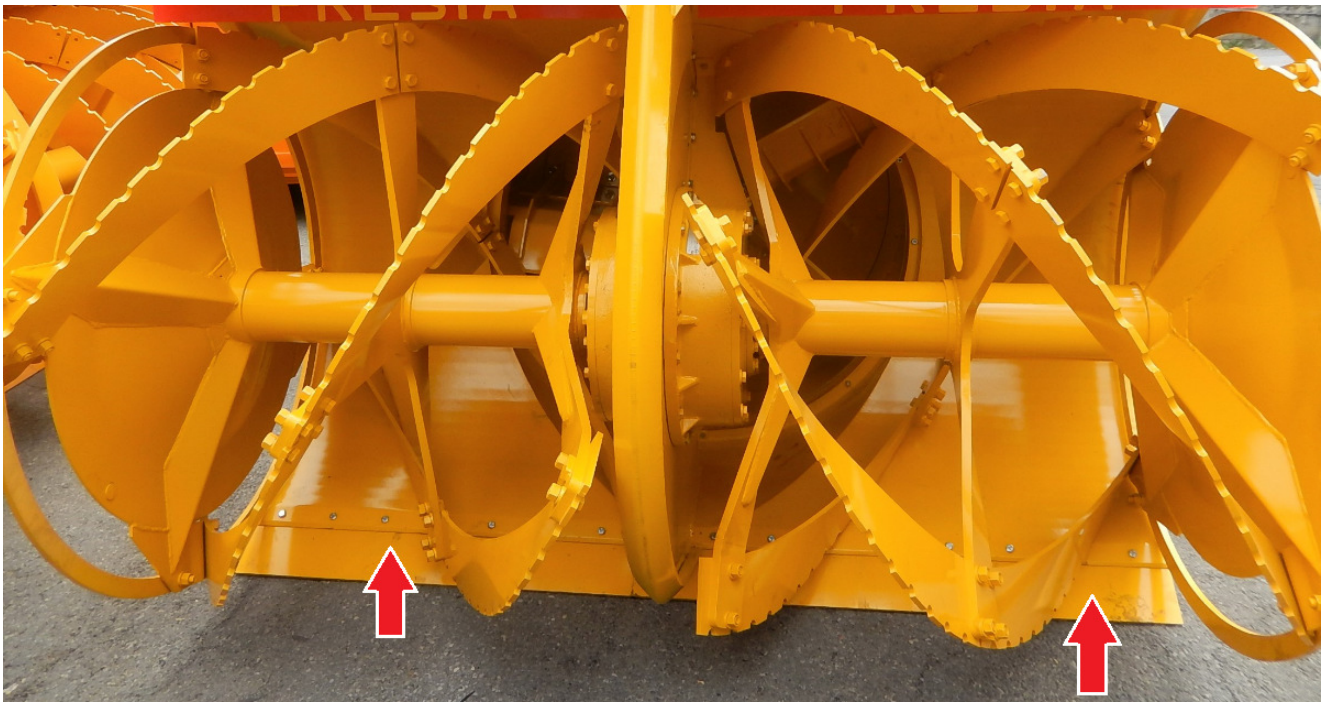
Requested spare parts:

- Iron blade L.2500 (nr. 1) **00108502**

Specific tools:

PROCEDURE:

> ***People operating on engine must wear protective clothes according to the regulations in force***



a) Check the front blades (1) wearing.

IF IT IS NECESSARY, REPLACE IT:

b) Lift up the blower head.

c) Shut down the engine and extract the key.

d) Insert the blower head safety bars (see the procedure for blower head safety bars installation on chapter 4).

e) Unscrew the screws (2) and remove the worn front blades (1);

f) Install the new blades and fix it with the screws (2).

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **F_02**

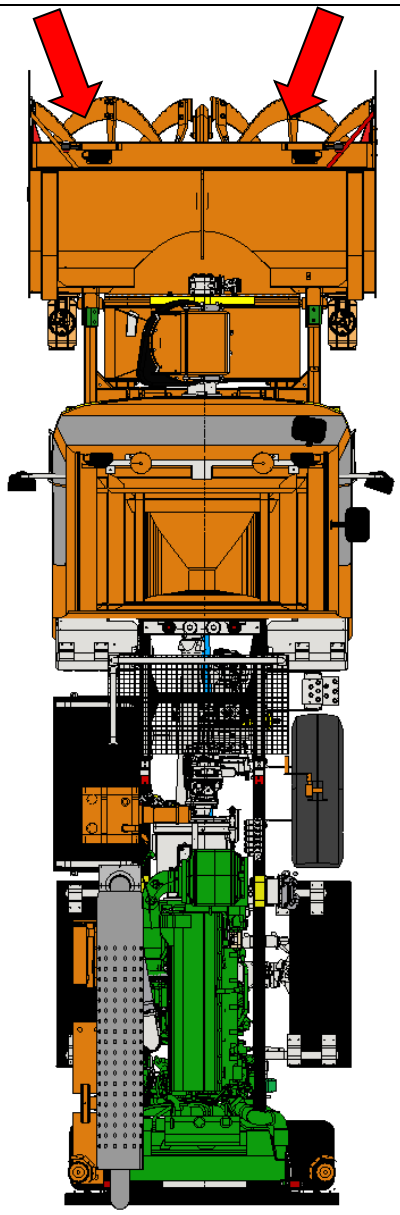
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: BLOWERS HELICAL CUTTERS WEARING CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time:**	5 minutes

Action points:



Requested spare parts:

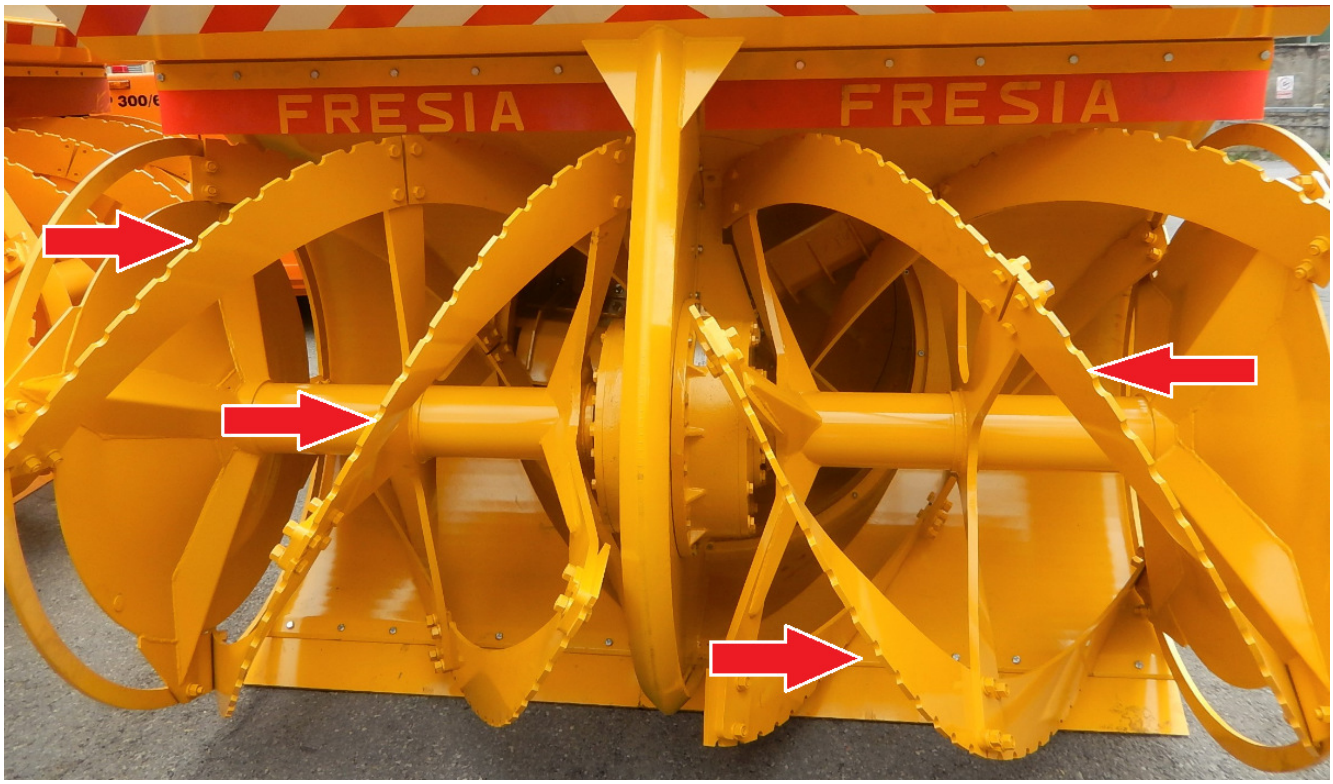
- Nr. 4 Right external cutter code **00108479**
- Nr. 4 Right internal cutter code **00108473**
- Nr. 4 Left external cutter code **00108480**
- Nr. 4 Left internal cutter code **00108474**

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

a) Check the wearing of the helical cutters (1) of the blower head.



IF IT IS NECESSARY, REPLACE THEM:

b) Move the vehicle on a flat area, shut down the engine and extract the key.

c) Remove the blowers shear bolts (3) in both sides (see the procedure for shear bolts replacement on chapter 4), it allows the rollers to freely rotate.

d) Screw and remove the helical cutters (1).

e) Fix the new cutters with the screws (2) and after having replaced them.

WARNING:
Replace also the nuts of the screws.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **F_03**

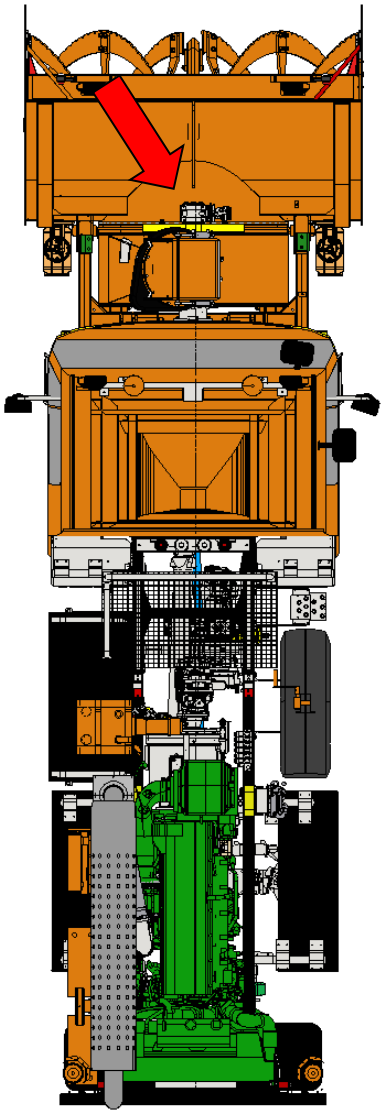
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention: SECOND STAGE PADDLES WEARING CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	BEFORE STARTING	**Required time:**	5 minutes

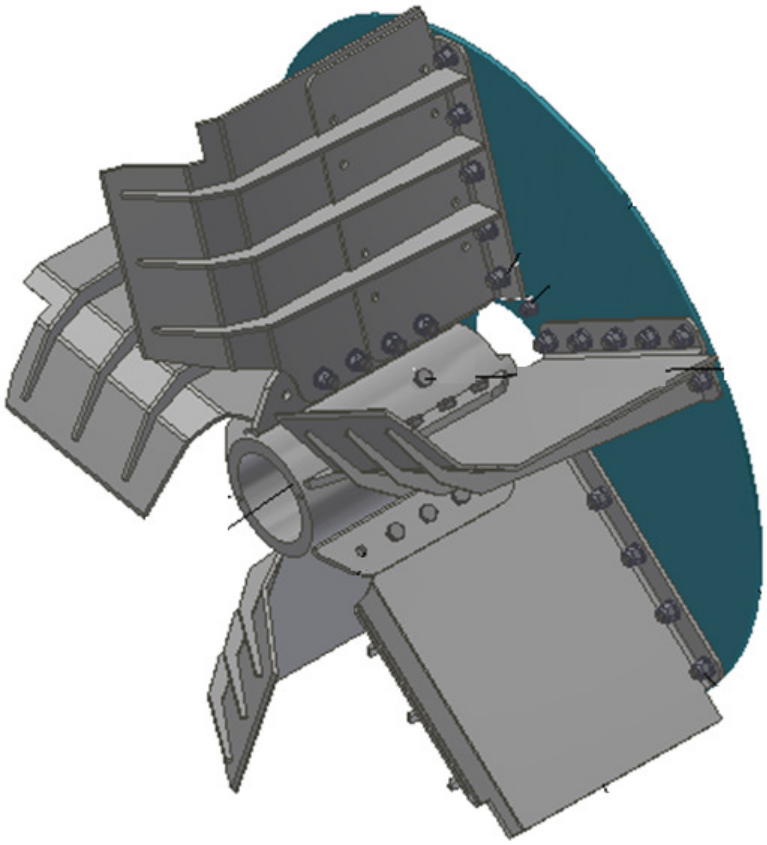
Action points:



Requested spare parts: • Paddles code (nr. 5): **00107014**	**Specific tools:**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Check the paddles wearing of the second stage.

IF IT IS NECESSARY, REPLACE THE PADDLES:

NOTE: For the following operation, it is necessary to disconnect the blowerhead from the vehicle.

ON A FLAT AREA

b) Remove the second stage shear bolts (see the procedure of share bolts replacement in chapter 4).

c) Slide out the blower.

d) Unscrew the screws and remove the paddles.

e) Place the new paddles and screw the screws. Replace the old screws with new ones.

WARNING:
With the pladdles, replace also the nuts and the screws.

PART NUMBERS	DESCRIPTION	Q.TY
V00.6009	Screw 18x2,5x70	10
V00.7302	Screw 18x2,5x60	10
V00.7303	Screw 18x2,5x50	10
V00.6188	Screw 18x2,5x50 10.9	40
R00.5652	Washer	70
D0011732	Nut	70

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **F_04**

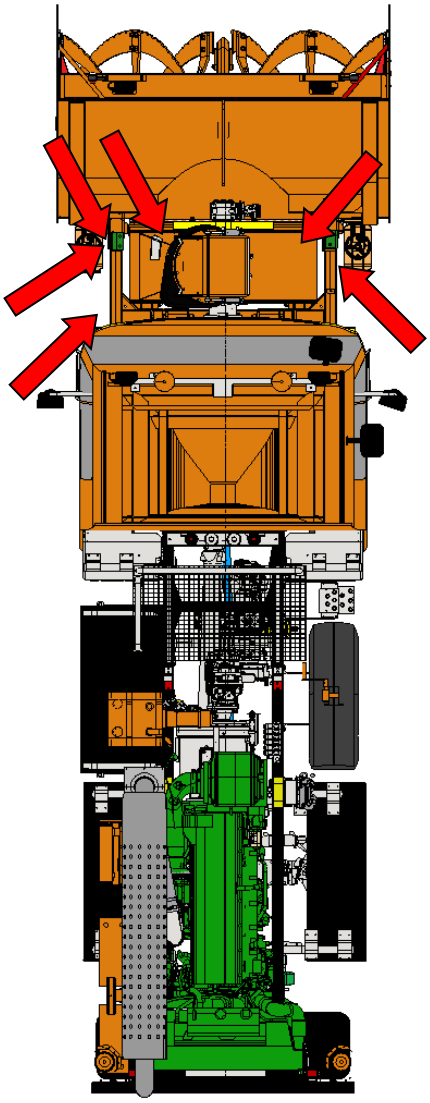
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: BLOWER HEAD LUBRICATION

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	15 minutes

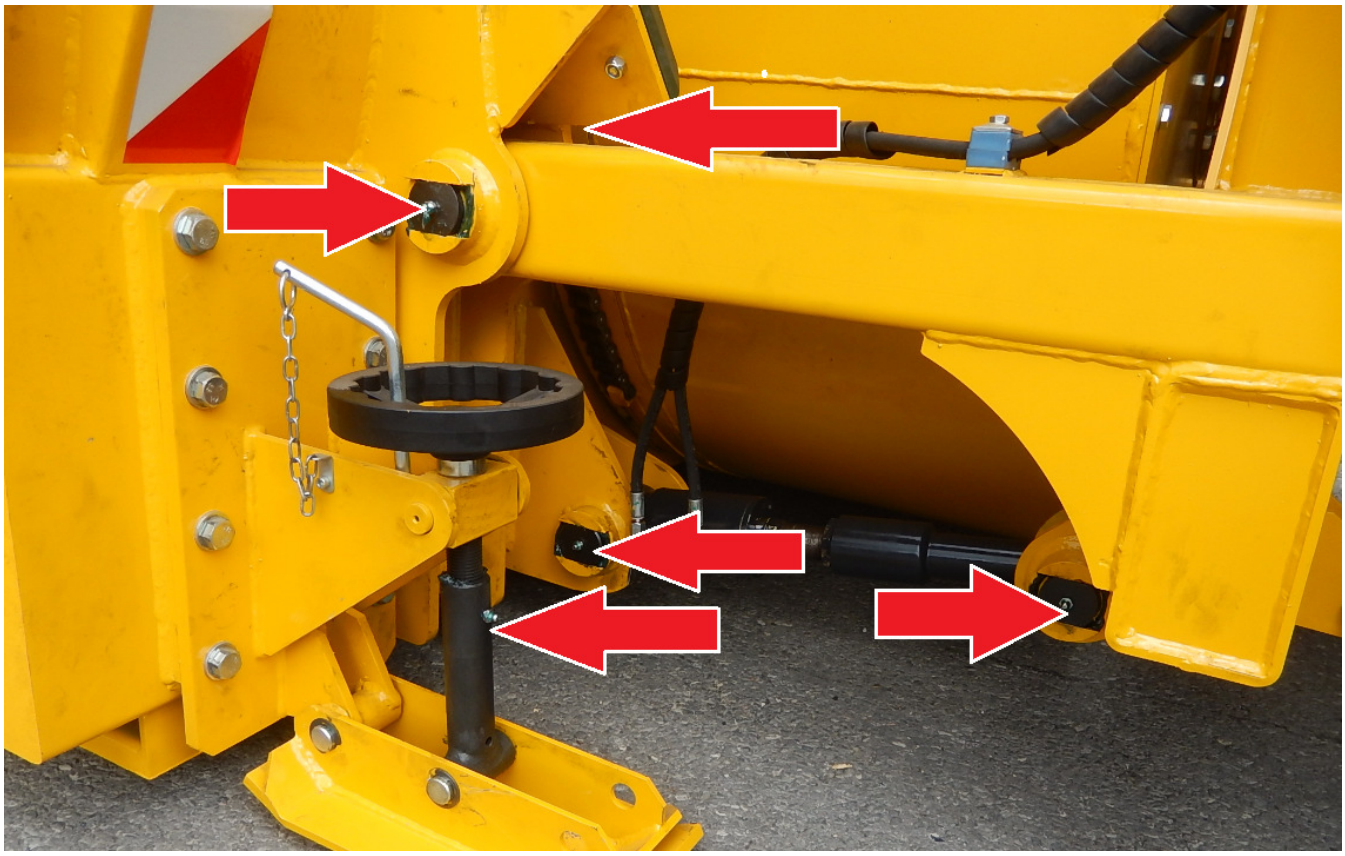
Action points:



Requested spare parts:	**Specific tools:**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



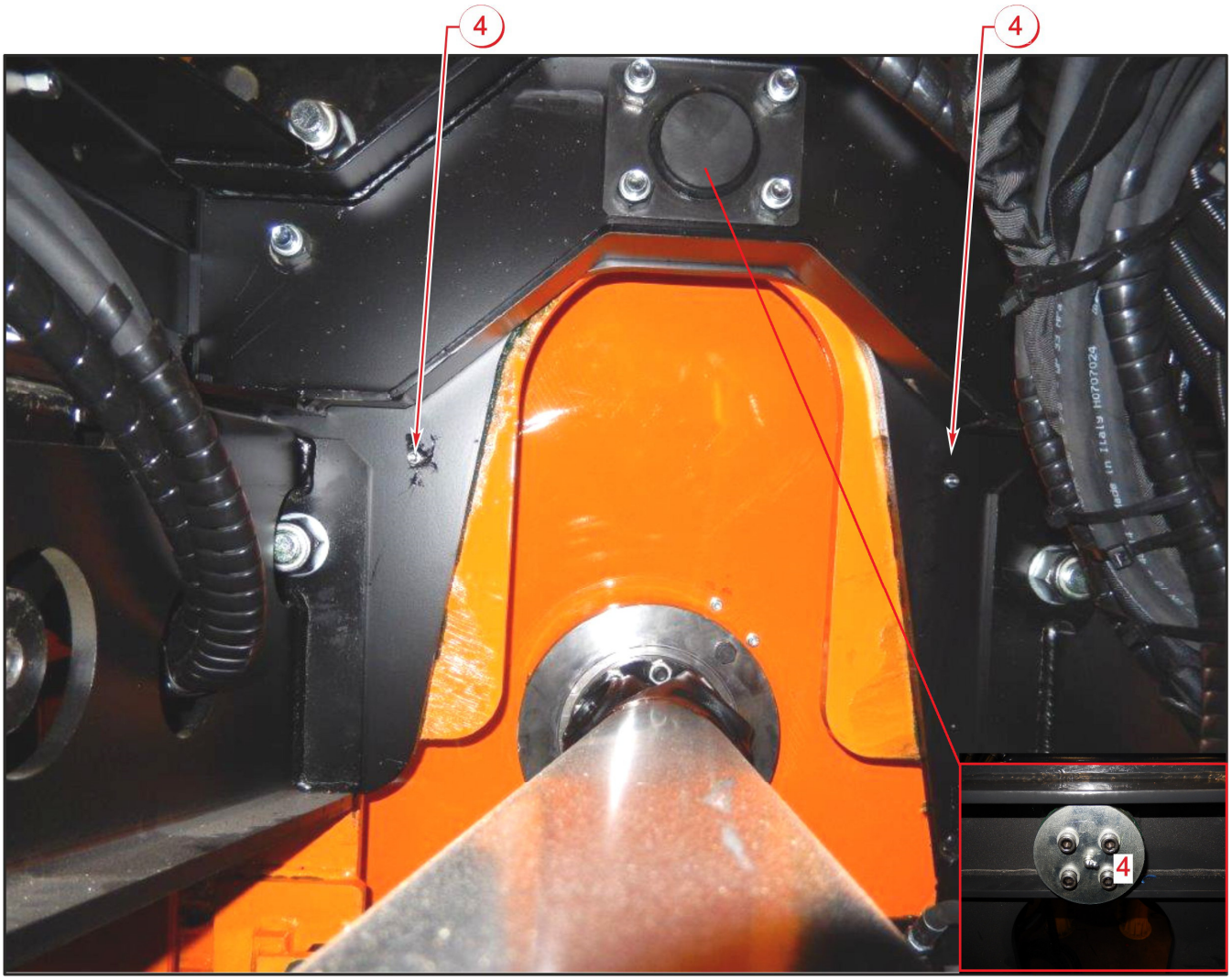
NOTE:

Grease:

- ***the chain (1) for the conveyor rotation.***
- ***the adjustment screws (2) of the sliding element.***
- ***the pins (3) of the blower head articulation.***

a) Inject grease into the fittings.

DOCKING PLATE LUBRICATION



NOTE:

Grease the front docking plate (4) injecting grease into the two fittings (4).

a) Inject grease into the fittings (4).

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **F_05**

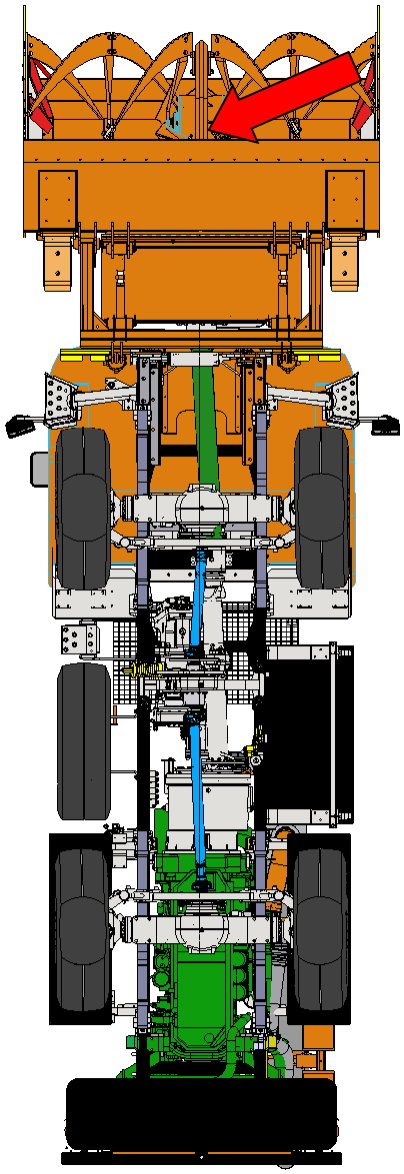
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: FIRST STAGE OIL LEVEL CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time**	10 minutes

Action points:



Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

a) Screw the plug (1) and check that the oil level reaches the lower part of the opening.

b) If it is necessary, refill through (1).

c) Screw back the plug (1).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

Maintenance sheet

	ELECTRIC		MECHANIC		FLUIDIC
	CLEANING		LUBRICATIONS	■	INSPECTION

Sheet n°

F_06

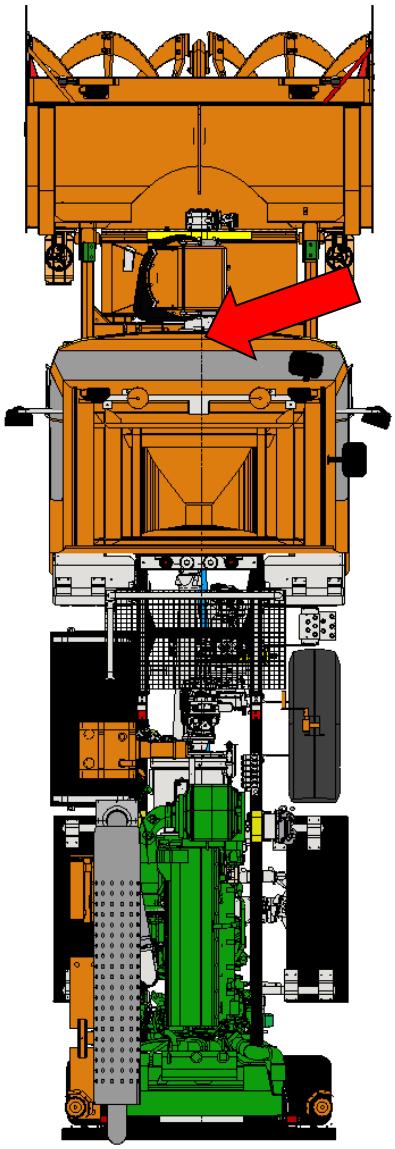
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: SECOND STAGE OIL CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	10 minutes

Action points:



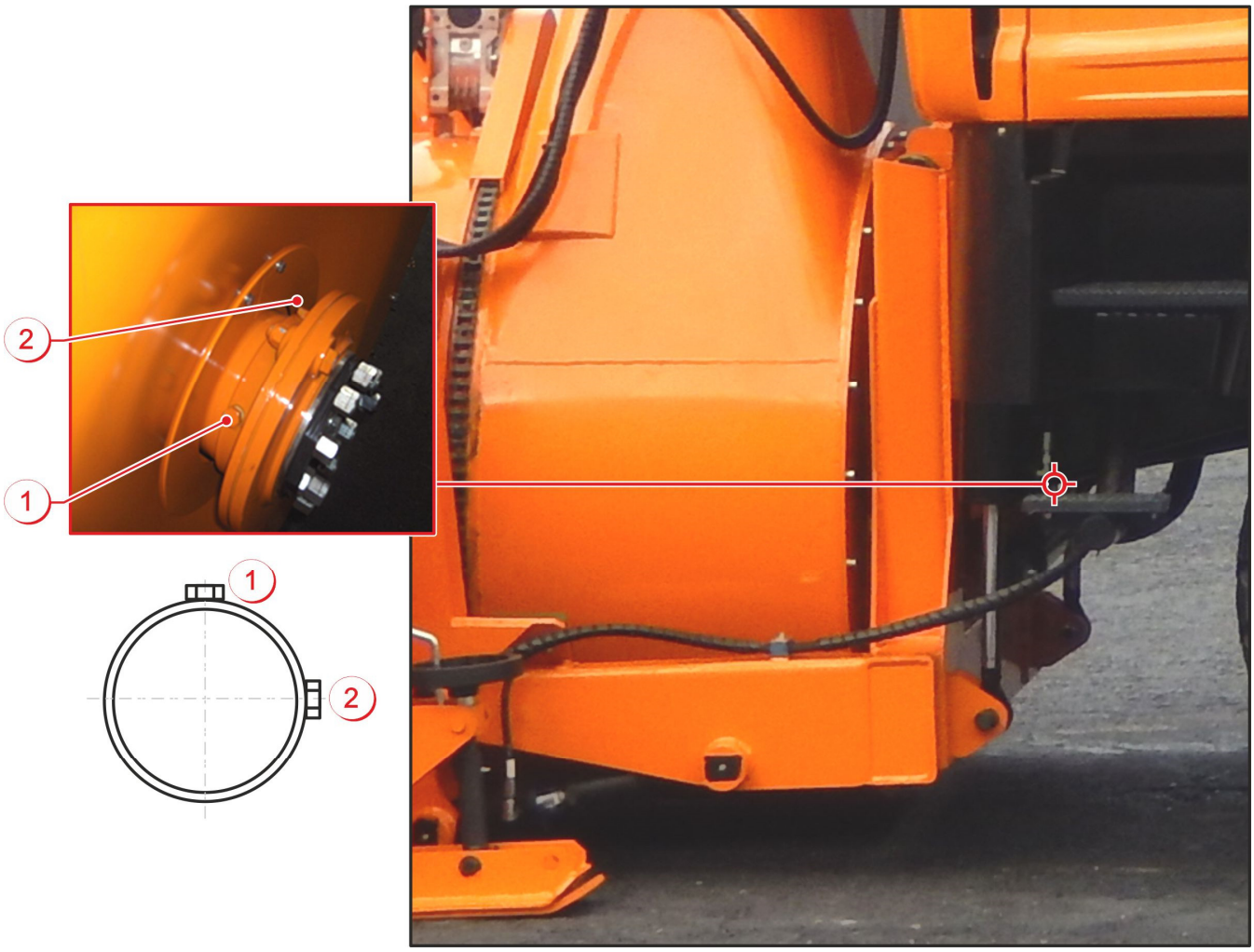
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.

Specific tools:

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Rotate plug (1) in upper position.

b) Pour slowly 0,5 litres of oil to allow the air to come out.

c) Remove the plug (2) and check if the oil flows out. If not, screw back the plug (2) and add further 0,5 litres in (2).

d) Screw again the plug (2) and let oil flowing out into the container. This is the correct procedure to have the correct level.

e) Screw back the plug (1)

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ■ FLUIDIC ☐ CLEANING ☐ LUBRICATION ☐ INSPECTION	**Sheet n°** **F_07**

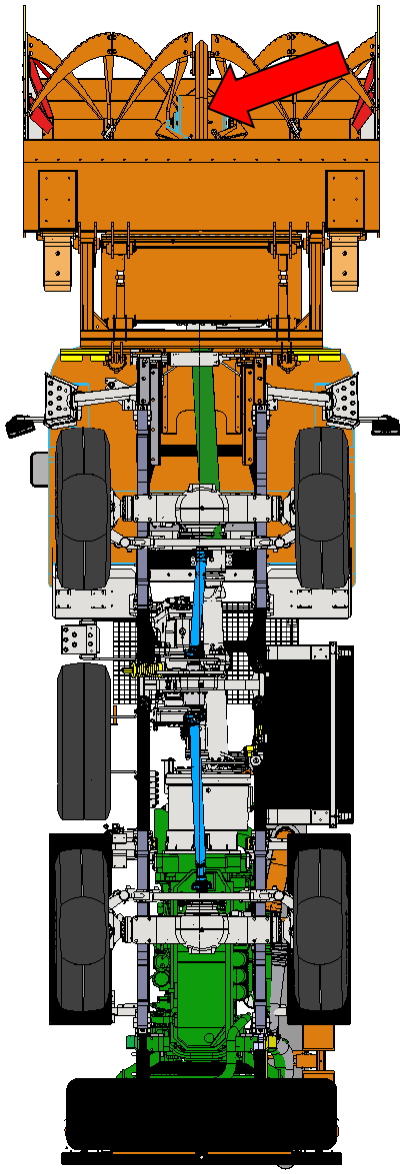
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: FIRST STAGE OIL REPACEMENT

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity:	EVERY 500 HOURS (1 YEAR)	**Required time:**	20 minuti

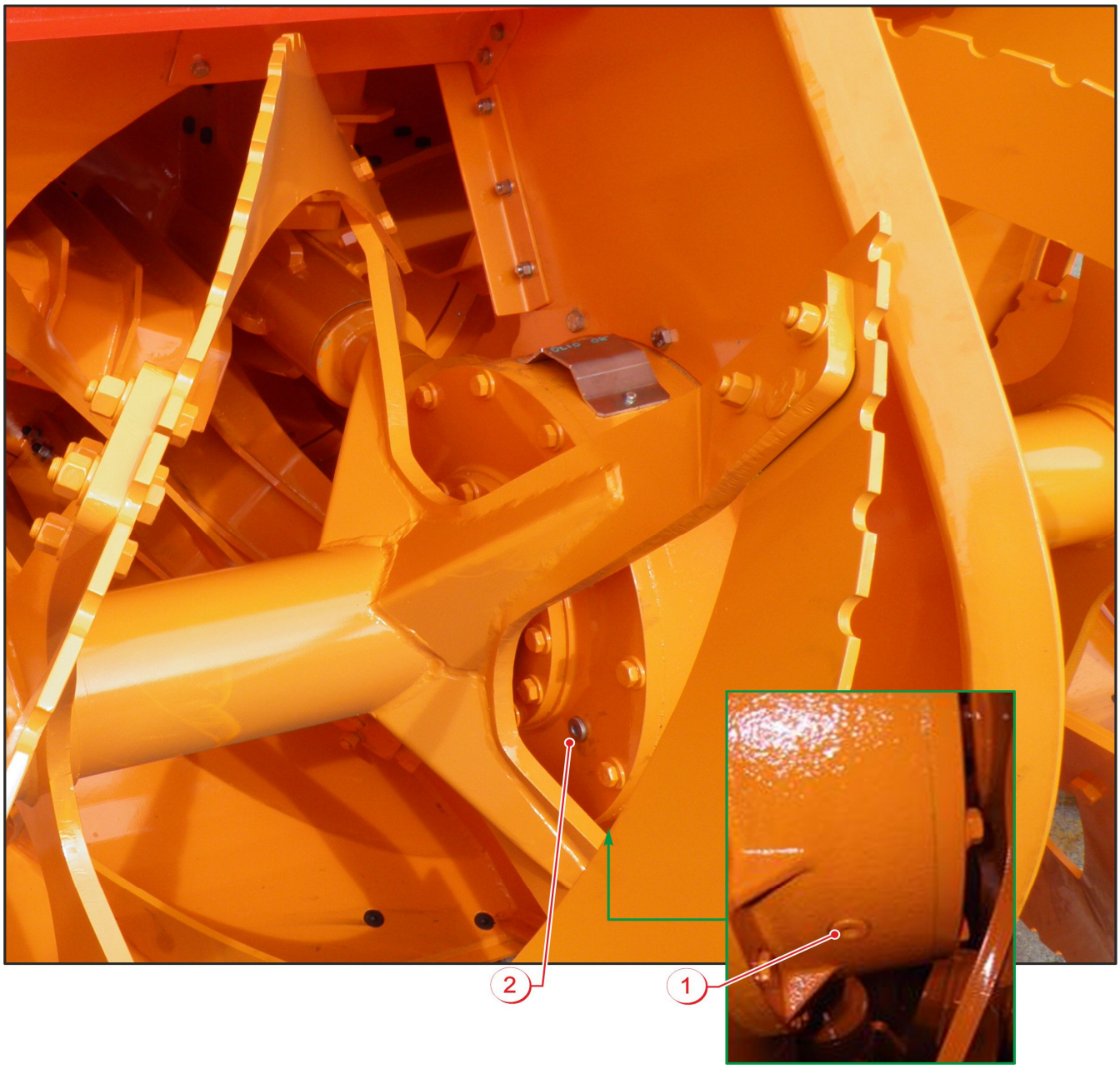
Action points:



Requested spare parts: • Oil type **TUTELA W90/M-DA** or equivalent.	**Specific tools:**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force



a) Put a container under the plug (1).

b) Screw the plug (1) and let all the oil flowing out.

c) When the oil has completely drained screw back plug (1).

d) Pour the new oil through the opening (2) till it reaches the lower part of the opening.

e) Screw back the plug (2).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

Maintenance sheet

☐	ELECTRIC	☐	MECHANIC	■	FLUIDIC	**Sheet**	
☐	CLEANING	☐	LUBRICATION	☐	INSPECTION	**F_08**	

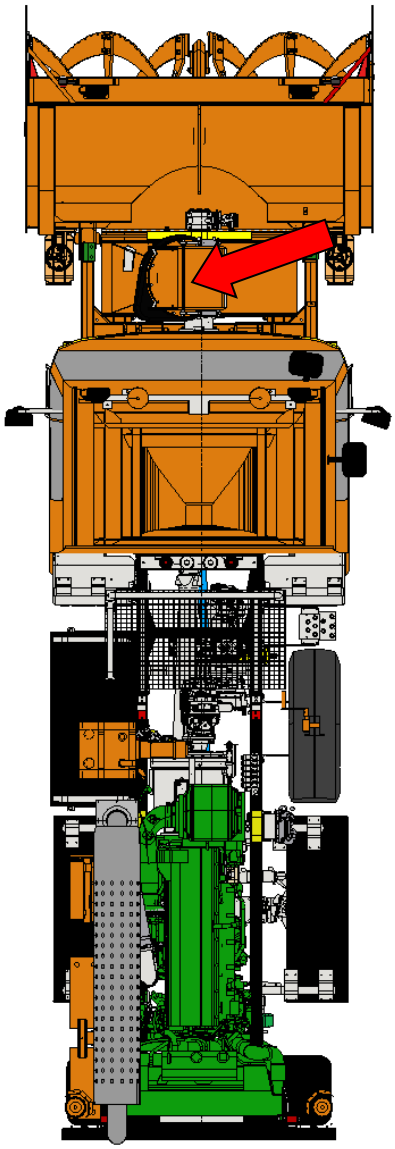
Vehicle type	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type SECOND STAGE OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	**BLOWER HEAD**	TWO SPEED BACK GEAR

Periodicity	EVERY 500 HOURS (1 YEAR)	**Required time:**	20 minutes

Action points



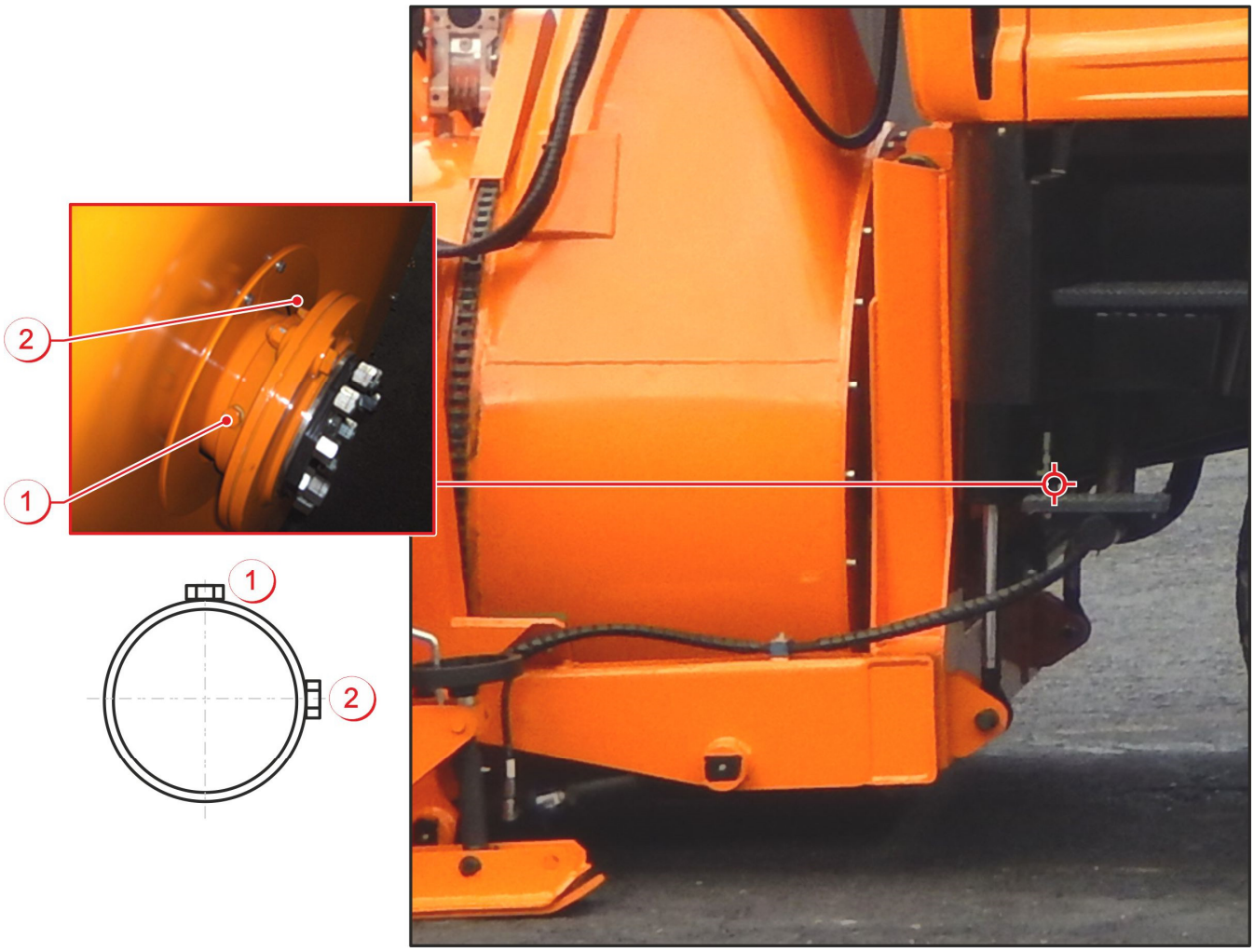
Requested spare parts

- Oil type **TUTELA W90/M-DA** or equivalent.

Specific tools:

PROCEDURE

People operating on engine must wear protective clothes according to the regulations in force



a) Put a container under the plug (2).

b) Screw the plug (2) and rotate it in lower position to leave all the oil flowing out.

c) Screw back the plug (2).

d) Rotate (1) in the upper position.

e) Pour slowly about 2 litres of oil in (1) to allow the air to come out.

f) Screw the plug (1) (it should be in horizontal) and let that exceeding oil flows out.

When the oil stops to flow, the correct lever is reached.

g) Screw back the plugs (1) and (1).

WARNING

Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **G_01**

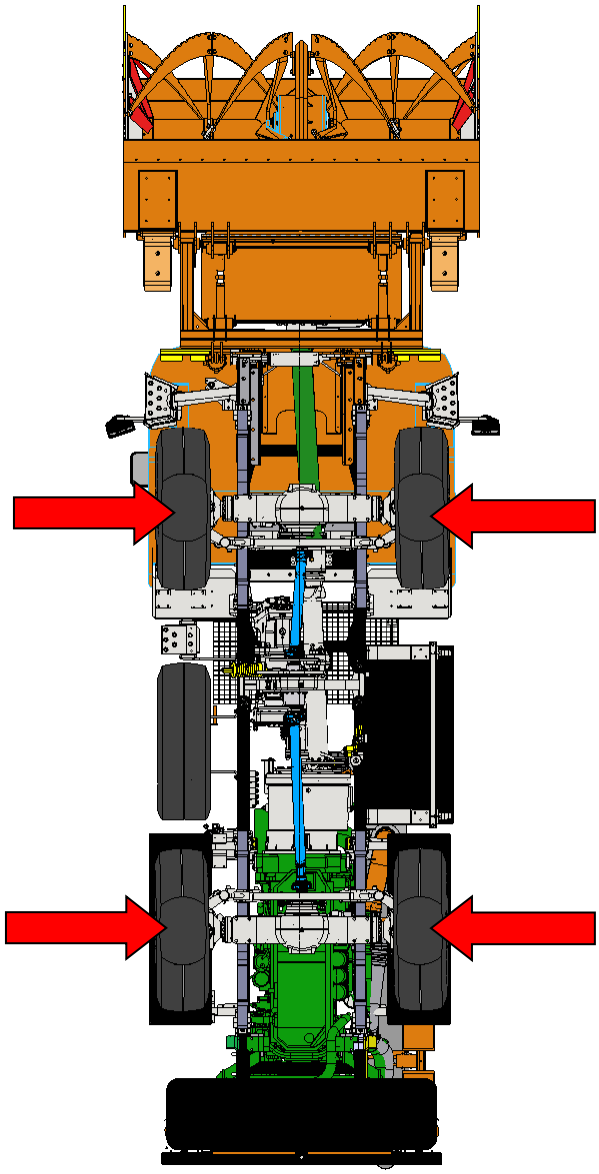
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: TYRES PRESSURE CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	10 minutes

Action points:



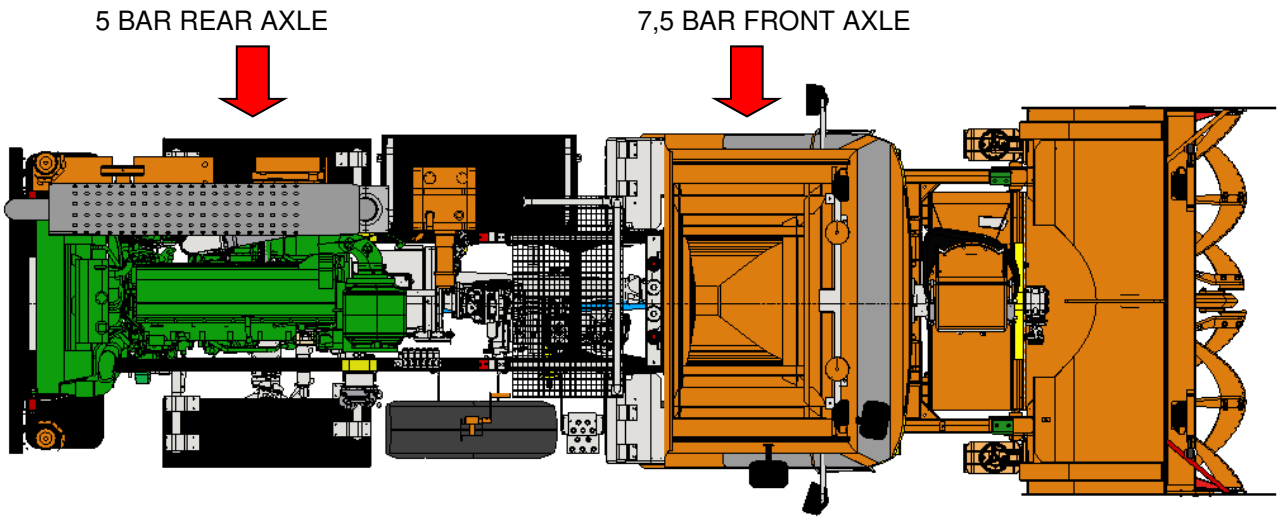
Requested spare parts:	**Specific tools:** **Manometer**

PROCEDURE:

People operating on engine must wear protective clothes according to the regulations in force

a) Check the pneumatic pressure.

Correct values arethe following:



WARNING:

When pressure is too LOW, they heat up causing a quick lateral wear.

When pressure is too HIGH, the tyre becomes stiff that cause wearing in the central part.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ☐ FLUIDIC ☐ CLEANING ☐ LUBRICATION ■ INSPECTION	**Sheet n°** **G_02**

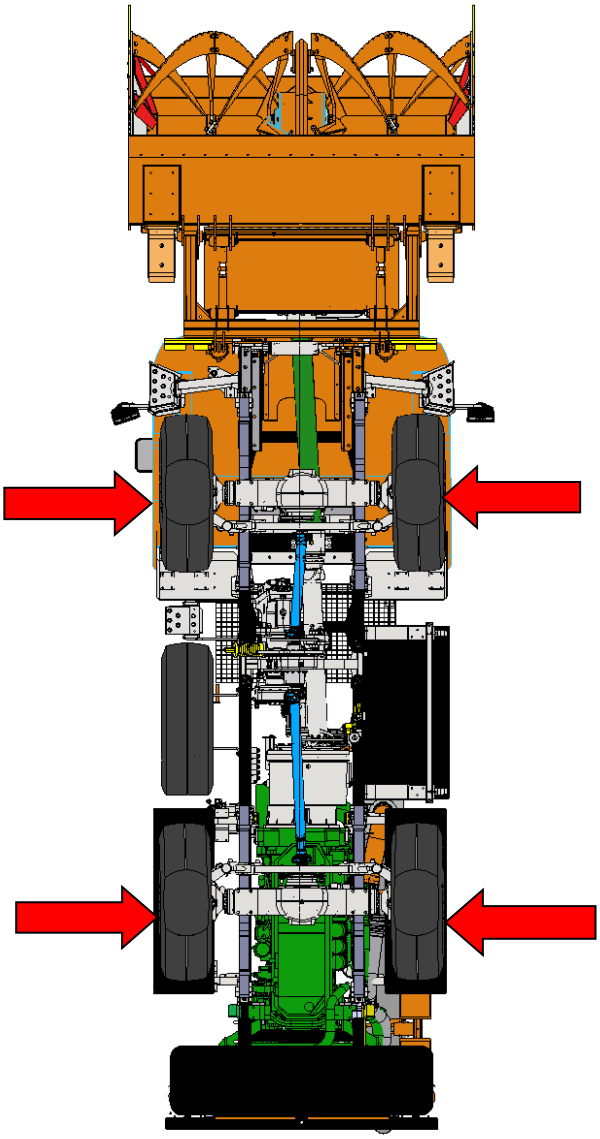
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: WHEEL NUTS TORQUE CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	TWO SPEED BACK GEAR

Periodicity:	EVERY 50 HOURS	**Required time:**	20 minutes

Action points:



Requested spare parts:	**Specific tools:**

PROCEDURE:

> ***People operating on engine must wear protective clothes according to the regulations in force***

a) Check the tightening of nuts fixing the wheels to the hubs. Tightening torque: **470 Nm**

Maintenance sheet

☐	ELECTRIC	☐	MECCANIC	☐	FLUIDIC
☐	CLEANING	☐	LUBRICATION	■	INSPECTION

Sheet n°

H_01

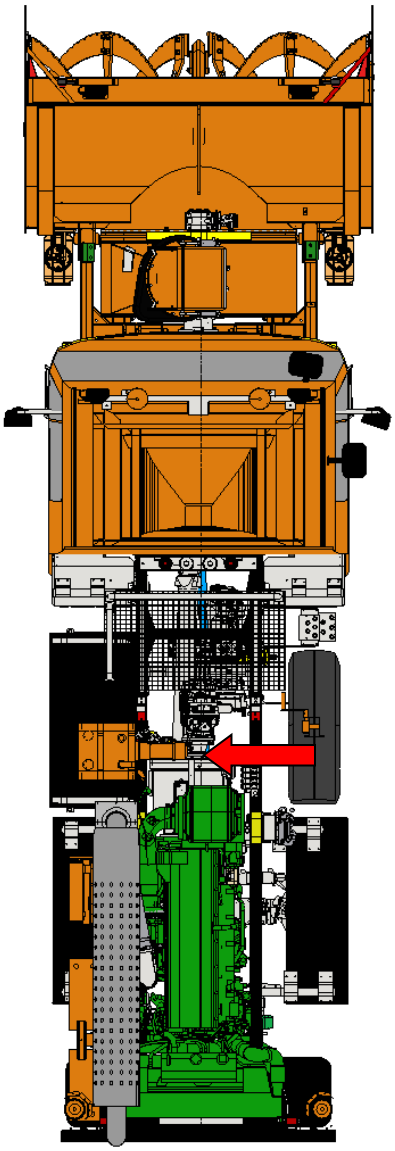
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: TWO-SPEED BACK GEAR OIL LEVEL CHECK

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	**TWO SPEED BACK GEAR**

Periodicity:	EVERY 50 HOURS	**Required time:**	10 minutes

Action points:



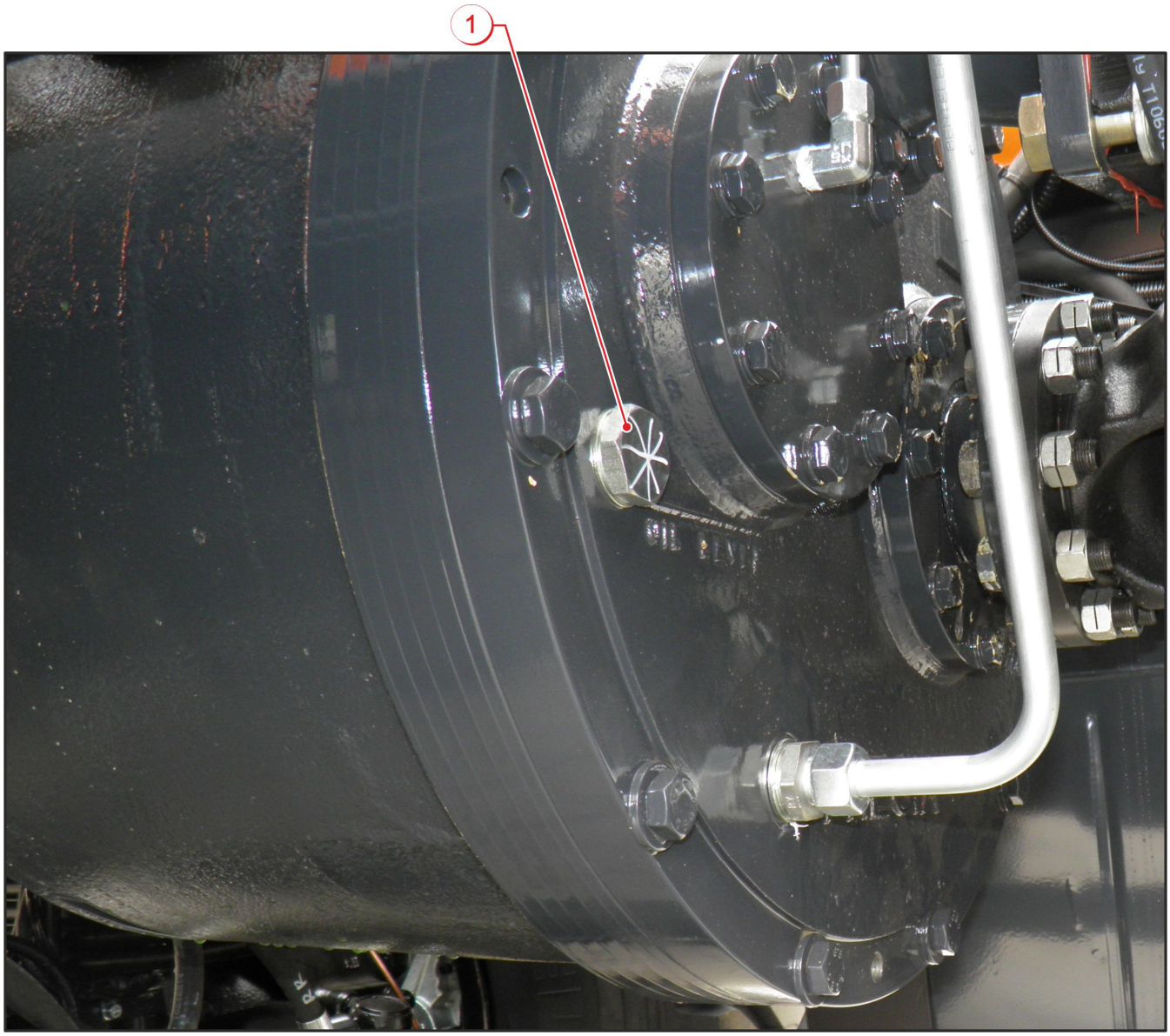
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.

Specific tools:

PROCEDURE:

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.



a) Move the vehicle over an inspection pit.

b) Unscrew plug (1) and check that the level reaches the lower part of the opening.

c) If necessary, refill.

d) Screw back the plug (1).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent.

FRESIA	**Maintenance sheet** ☐ ELECTRIC ☐ MECHANIC ■ FLUIDIC ☐ CLEANING ☐ LUBRICATION ☐ INSPECTION	**Sheet n°** **H_02**

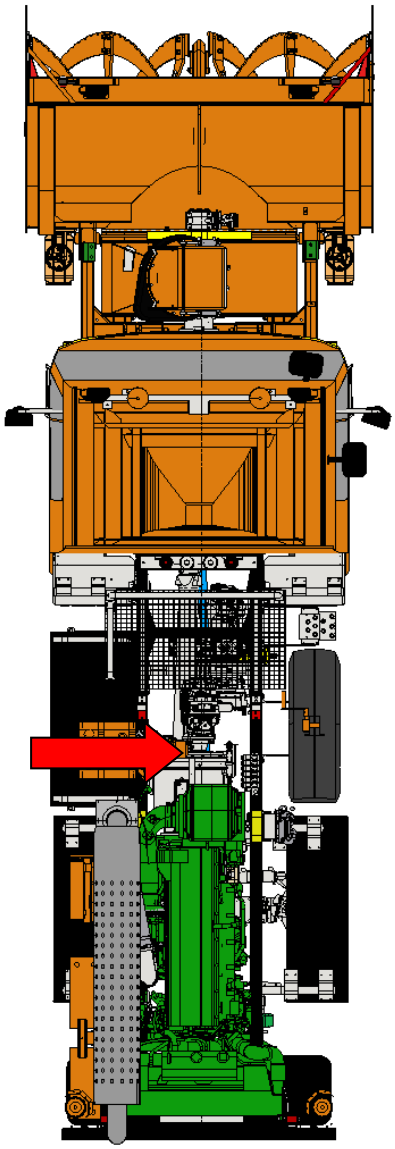
Vehicle type:	**SNOWBLOWER**	**Model:**	**F90 STI**

Intervention type: TWO-SPEED BACK GEAR OIL REPLACEMENT

ENGINE	HYDROSTATIC TRANSMISSION & HYDRAULIC SYSTEM	AXLES	SUSPENSIONS
TYRES	TRANSFER REDUCER	BLOWER HEAD	**TWO SPEED BACK GEAR**

Periodicity:	EVERY 500 HOURS (1 YEAR)	**Required time:**	30 minutes

Action points:



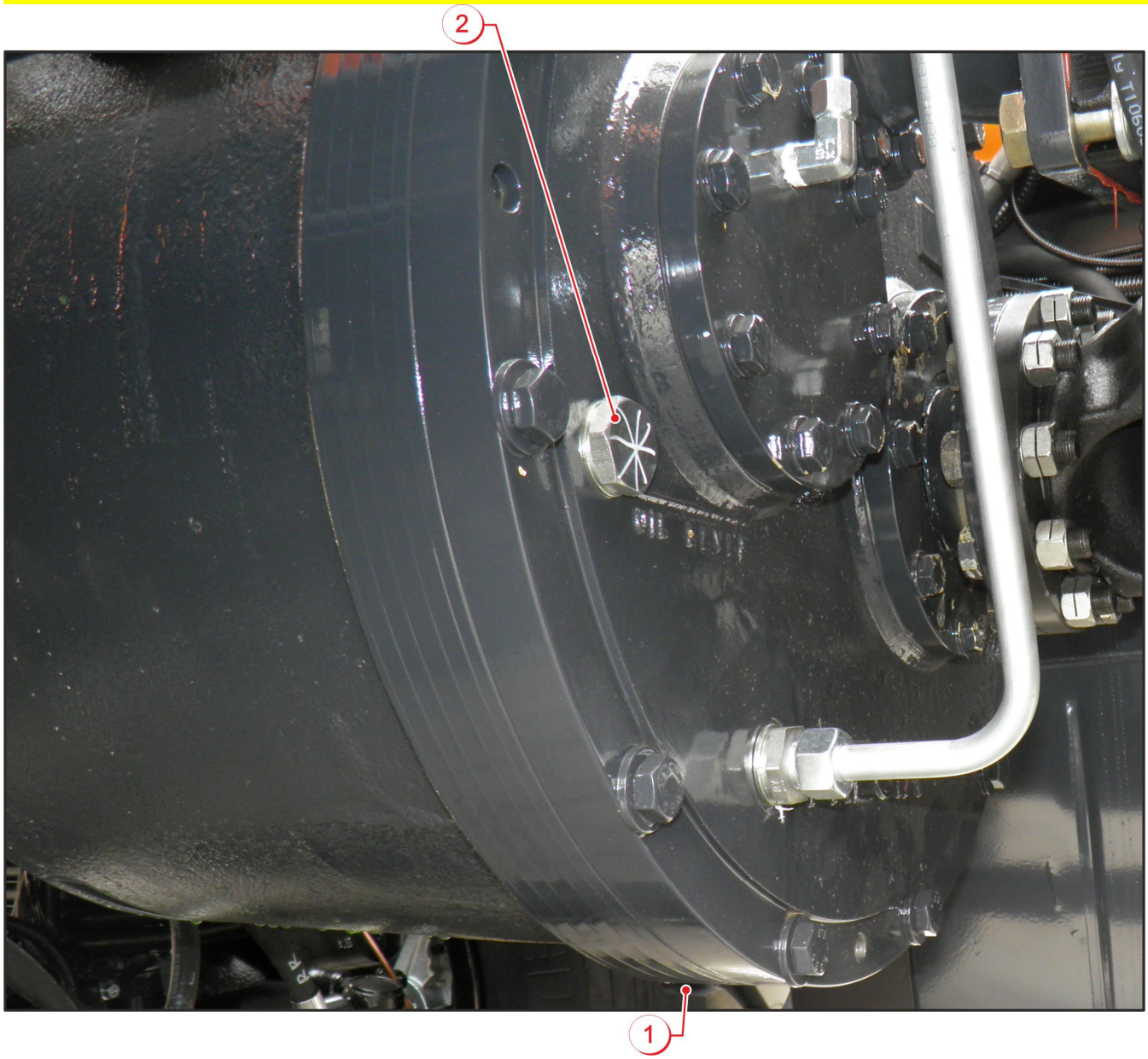
Requested spare parts:

- Oil type **TUTELA W90/M-DA** or equivalent.
- Plugs gasket
  (1) and (2) code **R0082099 Fresia S.p.A.**

Specific tools:

PROCEDURE:

WARNING:
People operating on engine must wear protective clothes according to the regulations in force.



a) Move the vehicle over an inspection pit.

b) Put a container under the plug (1).

c) Unscrew plugs (1) and (2), let the oil completely flow out.

d) When oil had completely drained screw back plug (1) (replace the gasket of plug (1)).

e) Fill the new oil through the opening (2) untill it reaches the lower part of the opening.

f) Screw back plug (2) (replace the gasket of plug (2)).

WARNING:

Use only TUTELA W90/M-DA oil or equivalent