

# MERLIN and MAGNUM

UniDrive truck mounted road sweeper

FAYAT



Operator Instructions

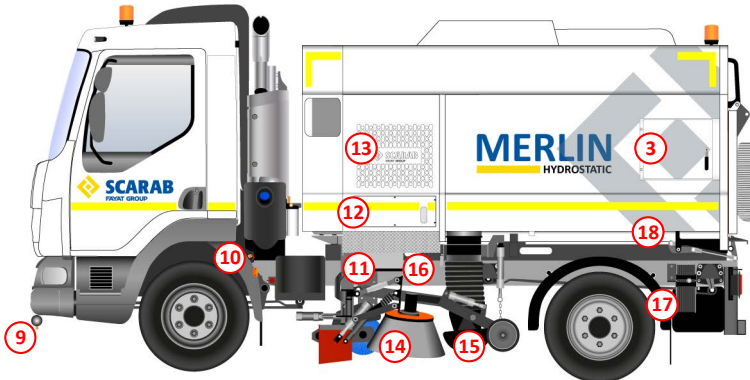
SCARAB ♦ Leave nothing behind

## Main Features

1. Water tank
2. Locker
3. Side loading hatch
4. Door open/close ram
5. Rear wander hose (standard)
6. Fuel tank  
(orientation determined on chassis type)
7. Low pressure water pump and valves
8. Central brush assembly
9. Low pressure and/or high pressure spray bar

## Operating Instructions

## Merlin and Magnum UniDrive



10. High pressure front spray bar shut-off valve (option)
11. Pneumatic system cabinet
12. Main hydraulic valve block access cover
13. Hydraulic oil cooler location
14. Side brush assembly
15. Suction nozzle assembly
16. Auxiliary hand pump
17. High pressure retractable hose (option)  
(orientation determined on chassis type)
18. Rear door locking mechanism

# Merlin and Magnum UniDrive

## Operating Instructions

### Incorporating Operator's Basic Maintenance Information

**Part No. SCAZ038022**

Version: 3.0.00 .....6th February 2024

To get the latest version of this Operator's Manual visit our website [scarab-sweepers.com](http://scarab-sweepers.com)

This manual is published by the Technical Publications Department of Scarab Sweepers Ltd. and every effort is made to ensure that the information it contains is correct at the time of publication. Due to a policy of continuous development, however, the Company reserves the right to alter the specification and to supply when so altered without reference to illustrations and descriptions in this manual.

Scarab Sweepers Limited.

Pattenden Lane, Marden, Tonbridge, Kent TN12 9QD, United Kingdom

T: +44 (0) 1622 831 006

E: [scarab@scarab.fayat.com](mailto:scarab@scarab.fayat.com) - W: [scarab-sweepers.com](http://scarab-sweepers.com)

Registered in England No. 1823459 - VAT No. GB 374 5002 68

Registered Office: Pattenden Lane, Marden, Tonbridge, Kent TN12 9QD, United Kingdom

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## General information



**WARNING - Voltage sensitive components.**  
**Do not use a boost starter / super start. A boosted start will burn out the vehicles electronic control nodes.**  
**If batteries are not charged always use a fresh set.**



CB Radios and other electrical equipment used in the sweeper should be properly suppressed (EMC) to prevent the possibility of interference in the sweeper's electronic system.

## Typical weights, dimensions and capacities

Gross Vehicle Weight (GVW) *	14 to 18 tonne
Gross Vehicle Weight (GVW) Magnum *	15 to 18 tonne
Overall Height (hopper lowered)*	3000 to 3500mm
Overall Length *	5640 to 7500mm
Overall Width (brushes stowed) *	2500mm
Hopper Gross Volume *	6.2m <sup>3</sup> to 8.2m <sup>3</sup> Gross
<b>Tank Capacities*</b>	
Hydraulic Tank	25 litres
Water Tank *	1250 litres to 1800 litres
<b>Noise Levels</b>	
In cab	Between 70 - 84 dB(A) dependent on operating speed
External	Maximum L <sub>WA</sub> of 114 dB(A) in accordance with directive 2000/14/EC
<b>Vibration</b>	
Description	All dynamic prime moving components are resiliently mounted to minimise vibrations. In accordance with 2006/42/EC as amended.
Whole body	Equipment does not exceed 0.5 m/s <sup>2</sup> (RMS, weighted)
Hand Arm	Equipment does not exceed 2.5 m/s <sup>2</sup> (VTV)

\* Dependent upon model



*In view of the fact that many variables such as chassis and machine specification affect the weight and dimensions of the finished machine, it is not possible to quote these precise details. If this type of information is required, please contact our Technical Sales staff giving your sweeper's Serial Number.*

## Towing



**Refer to chassis manufactures recommendations.**

**Serious damage to the transmission will result if the vehicle is towed while the gearbox is engaged.**

## Identification Plates

The SERIAL NUMBER PLATE is located on the rear face of the left hand suction nozzle spigot.

The Serial Number will comprise four or five numerical digits only (for example 5843 or 13672).

For the location of the vehicle's VIN PLATE and CHASSIS NUMBER, refer to the chassis manufacturers' documentation.

## Limitations of Use

The Merlin and Magnum are classified as truck-mounted heavy-duty suction road sweepers and, as such, are intended only for operation in the sweeping and associated roles for which they have been expressly designed.

The sweeper bodywork is integrated to the truck/carrier vehicle, and is therefore not demountable.

## Applicability

This manual covers the operating requirements of the Scarab **Merlin** and **Magnum UniDrive** sweepers with the CANbus 3.1 system.



*Images used in this publication that depict equipment fitted to the sweeper may not look exactly the same or be in the same location as on your particular sweeper. The function of the displayed items will still be relevant. This is because of the large variety of truck chassis we fit our sweeper components to and are constantly evolving the products to better suit customer requirements and technology advancements.*



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## Health and Safety advice





**In the interests of your health and safety, it is important that the following points are observed at all times.**

- Only trained operatives should be allowed to drive or work on this machine.
- Before driving the machine ensure that all relevant machine checks have been carried out, that all equipment is stowed.
- Do not overload the hopper.
- Do not drive the machine with the hopper in the raised position, even if the hopper is empty.
- Always use the safety prop to support a raised hopper, other than during discharging.
- Never work under a raised cab, hopper or hopper door unless the appropriate safety prop is in position.
- Before operating either the hopper tip or rear door controls, ensure that there is sufficient clearance and that it is safe to do so. Ensure that all personnel are clear of the rear door.
- Before working on the machine, ensure that it is on firm, level ground. Apply the park brake, stop the engine and remove the ignition key.
- Always wear the appropriate personal protection equipment when operating or working on the machine.
- Before starting the engine ensure that all controls are switched off and that the machine is in neutral.
- Keep long hair, loose clothing and body parts away from moving parts on the machine.
- High pressure water can be hazardous. Always wear suitable face protection when operating the high pressure water pump and when using the lance.
- Do not direct the water jet at other persons. Beware of electrical installations on public buildings and lamp posts etc. Always exercise extreme caution in public places.
- The driver's seat should always be correctly adjusted as to give a good posture when driving. Do not adjust seat whilst driving.
- The mirrors should be adjusted so the driver has good all round view of the machine sides and sweeping equipment.
- When operating the machine in any mode always be aware of objects and people in the immediate vicinity, especially at the rear of the machine when reversing.
- Whatever the situation, remember that the rules of the traffic and road safety must be observed.
- Whilst operating this machine the safety and well being of other people in the immediate vicinity are the sole responsibility of the operator.
- Never ride on any part of the machine other than in the seats in the driver's cab.

 **The universal safety symbol as well as red text is used throughout this handbook and when encountered the related information must be adhered to.**

 *Refers to important information.*

 **Identifies cautionary information and specific procedures when required.**

 Refers to visual examination to confirm the condition or status of a specific item.

Other symbols not shown here may be used throughout this handbook. When encountered, they must be observed.

**Remember, failure to comply can result in serious injury.**

## Hazard awareness

All operators and workshop personnel should be aware of the physical and biological risks that are inherent in the operation of a road sweeper. The risk falls into two main categories as follows:

- Risks represented by the sweeper and its various systems.
- Risks represented by the sweeper's operating environment.

Both have the potential for exposure to a variety of hazards, ranging from hot surfaces to infectious diseases, that can occur during day-to-day operation, while carrying out adjustments or when involved with the general maintenance and servicing activities on the vehicle.

### Typical vehicle-related hazards are:

- Exposure to hot surfaces and sharp edges.
- Exposure to moving parts.
- Exposure to various fluids (including some hot and/or pressurised).
- Exposure to surface contamination resulting from general operating conditions.

### Typical environmental hazards are:








- Exposure to sharp objects (e.g. broken glass, discarded hypodermic syringes) while operating or working on the vehicle.
- Exposure to various infectious diseases (e.g. Legionnaire's, Weil's, Hepatitis, Tetanus) while operating or working on the vehicle.

## Safety precautions

When using external equipment such as the high-pressure water lance, or when dealing with potentially hazardous situations while sweeping (e.g. unblocking a suction nozzle), always wear the appropriate Personal Protection Equipment (PPE) and exercise extreme caution if required to handle any of the material being swept.

Before working on the vehicle, subject it to a thorough steam cleaning or high-pressure hot water wash using appropriate detergents etc. Even after taking all reasonable steps to reduce the risk from the hazards described, always wear the appropriate Personal Protection Equipment (PPE) when carrying out sweeping duties or when working on the vehicle.

This includes: -

-  *Safety gloves, including where necessary cut resistant knitted Kevlar.*
-  *Eye/face protection, if necessary full face mask with under chin lip.*
-  *Safety boots or shoes with protective soles and toecaps.*
-  *Respiratory masks.*
-  *Overalls or coveralls.*
-  *Earplugs or ear defenders as appropriate.*
-  *High visibility jackets or waistcoats.*

## Operating advice

Please remember, the information provided in this handbook is designed to ensure that the Scarab sweeper operates both safely and efficiently.

The design of this machine is for the removal of spoil on traffic areas, also litter collection, using the wander hose. A poorly maintained machine will become unreliable, inefficient and potentially dangerous. Always observe the recommended maintenance and safety related advice provided.

**i** *Unless it is wet or raining, ALWAYS use the low-pressure water spray system when sweeping. This will not only reduce the amount of dust generated, it will also ensure more efficient collection of material. This is because wet material is heavier and will drop more readily from the air stream inside the hopper. If swept dry more of the finer material will pass through the screen, wearing out the fan blades on its way back to the environment behind you.*

### Operators should be trained in the following elements

- Health and safety observations/notices
- Transit driving
- In-cab and external controls
- Hopper safety/cab prop use
- Brush setting
- Nozzle flap adjustment
- Correct sweeping operations
- Low and high pressure water systems
- Load discharge (tipping)
- Daily, weekly maintenance schedules
- End of day cleaning, ie: suction fan, fan screen and machine body

Operator training can be provided by Scarab Sweepers upon request.



**The LCD monitor's USB connection is for uploading/downloading information (ONLY) and must not be used for any other purpose.**



*It is the responsibility of employers to carry out their own risk assessment for the machine, operators or other persons using or affected by the machine and equipment.*



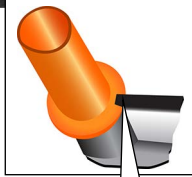
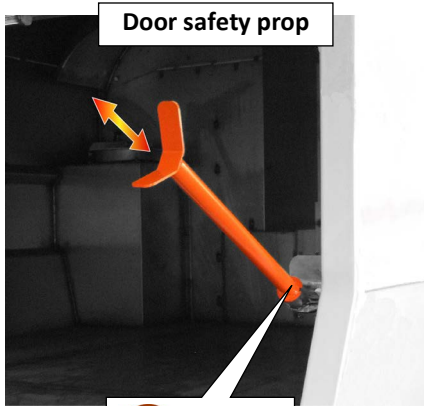
*Various safety, hazard and user information labels are fixed to the machine. These must be observed.*



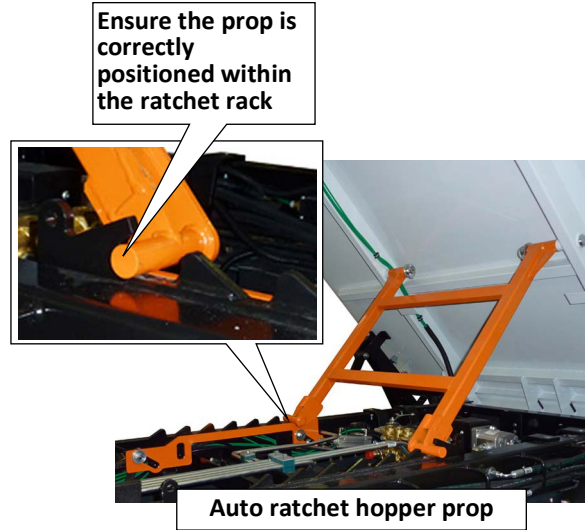
*Only personnel qualified in the relevant disciplines should be allowed to work on any of the machines HYDRAULIC SYSTEM.*



*For information regarding vehicle operation and maintenance, refer to the chassis manufacturer's handbook.*



When inserting the door prop, ensure it is correctly positioned in the locating slot





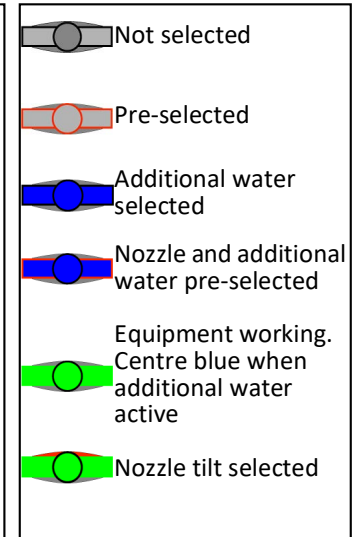
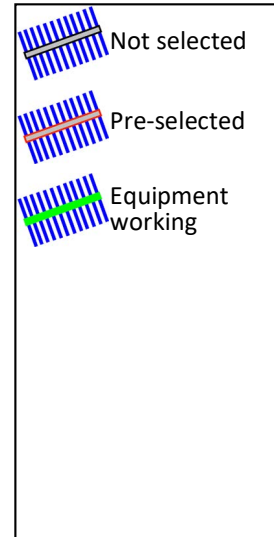
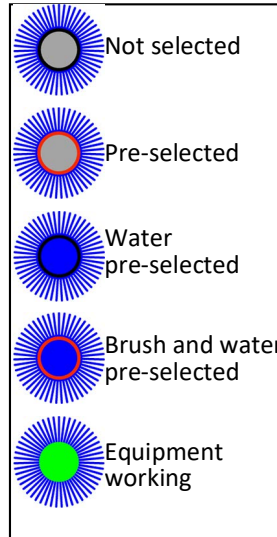
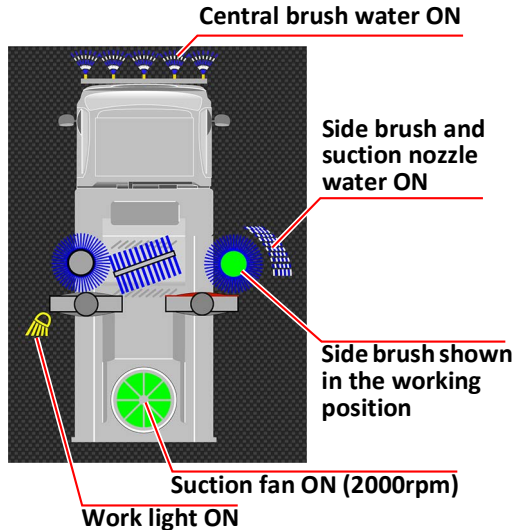
## The CANbus system

The CANbus system comprises two control panels (main and auxiliary) an LCD monitor and a number of control nodes. The system controls and monitors all sweeper functions and maintains a log of various operating parameters such as operating hours and any fault conditions that might occur.


**Switches:** The various types of switch function are grouped in two ways. Firstly they are colour coded as follows:



- Amber** = Electrical functions such as lighting.
- Red** = Critical functions (e.g. Stop or Engage PTO Drive).
- Green** = Sweeping functions.
- Blue** = Water Spray functions.


Each switch illuminates a function-related symbol on the LCD monitor (only installed equipment will be displayed). Each symbol is greyed-out until its switch is activated. When a switch is activated the appropriate symbol will illuminate according to system status as illustrated.





## Main control panel switch functions



 Switch functions are described from *Left to Right* and *Top to Bottom*.

  **F1 / F2** - Press to activate special options.


 **System Start** - Press to start/stop the system and engage/disengage PTO.

 **Brush Speed (-)** - Press to decrease brush speed. Brush speed remains set until reset.

 **Brush Speed (+)** - Press to increase brush speed, Brush speed remains set until reset


  **Left/Right Side Brush** - Press to start the side-brush.



  **Left/Right Suction Nozzle Raise/Lower** - Press to lower the suction nozzle.



 **Central Brush (Wide sweep)** - Press to start the central brush.

  **Left/Right Work Light** - Press to turn ON/OFF.

  **Left/Right Side Brush and Suction Nozzle Water** - Press to start the side-brush and suction nozzle dust-suppression.







 **Central Brush (Wide sweep) Water** - Press to start the dust-suppression spray for the central brush.

  **Increase/Decrease Engine Speed** - Press and hold down to reduce/increase the speed of the vehicles engine. A single press of the either switch will adjust engine speed by 50 RPM. Current engine speed is displayed along the top of the LCD monitor. This is chassis dependant. It is inoperable on some machines.

  **Left/Right Suction Nozzle - Additional Water (Option)** - Press to start the additional water jets for the suction nozzle.



### Auxiliary control panel (door pod) switch functions

-  **High Pressure Water Pump (Option)** - Press to start.
-  **Suction Fan** - Press to start the Suction Fan, approximately 2000 rpm.
-  **Cruise Control** - Not applicable.
-  **Nozzle Tilt (Locking Mode)** - Press to tilt the suction nozzle for larger items.
-  **Suction Fan 'Boost'** - With the Suction Fan ON, press to activate the fan boost mode. This increases fan speed to approximately 2200 rpm.
-  **Favourite Setting** - Press to memorise your preferred sweeping set-up. Hold the switch down until a 'beep' sounds. Thereafter, whenever the switch is pressed at system start-up, the memorised configuration will be automatically pre-selected/restarted. Repeat to over-ride with a new configuration.

**Multi-Function Lever** - ON (deploys all selected sweeping equipment). To stop and raise all sweeping equipment, return the lever to the OFF position.

In the ON position the lever can be used to control the side brush(es) and suction nozzle(s). These additional positions i.e. Left, Right and Back, return to the central position when released.

The brush and nozzle functions are controlled as follows:

#### On Left Hand Drive Vehicles

Move the lever to the left to swing OUT, and to the right to swing IN the side brush(es).

On machines fitted with variable extend and retraction, move the lever momentarily in the desired direction to 'nudge' the brush(es).

#### On Right Hand Drive Vehicles

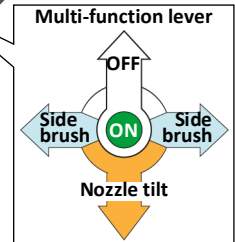
Move the lever to the right to swing OUT, and to the left to swing IN the side brush(es).

On machines fitted with variable extend and retraction, move the lever momentarily in the desired direction to 'nudge' the brush(es).

#### Nozzle Tilt Function

Move the lever back to momentarily tilt the suction nozzle or close it from TILT OPEN position.

On machines with variable nozzle-tilt, move the lever back to 'nudge' the suction nozzle DOWN from the TILT OPEN position.



## Auxiliary side brush controls

The auxiliary side brush is an extra side brush that is normally mounted ahead of the side brush. This brush has an extended reach so can be used to sweep at a greater distance than the standard side brush.

The controls for the auxiliary side brush are mounted on the top of the auxiliary control panel (door pod).

### Auxiliary side brush multi-function lever

**OFF** will stop, traverse retract, raise and stow the auxiliary side brush.

**ON** deploys and swings out the auxiliary side brush.

Whilst in the **ON** position the lever can be used to control the auxiliary side brush. These additional positions i.e. left, right and down, return to the central position when released.

The auxiliary side brush functions are controlled as follows:

#### Down

Move the lever **DOWN** to swing out the auxiliary side brush.

This needs to be done before you can traverse the auxiliary side brush

#### On vehicles with a left hand auxiliary side brush

Move the lever to the left to traverse extend out, and to the right to traverse retract in, the auxiliary side brush.

#### On vehicles with a right hand auxiliary side brush

Move the lever to the right to traverse extend out, and to the left to traverse retract in the auxiliary side brush.

Standard deployment sequence from the **OFF** position: -

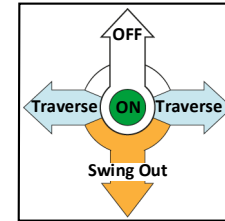
ON, DOWN, TRAVERSE EXTEND

The standard stowing sequence: -

TRAVERSE RETRACT, DOWN, OFF




**i** If you move the lever to the **OFF** position from a deployed position it will remember this and return to its deployed position when moving the lever to the **ON** position again.







Brush speed is controlled via a manual valve, usually located on the auxiliary side brush mounting.



### Hopper remote control switch box functions

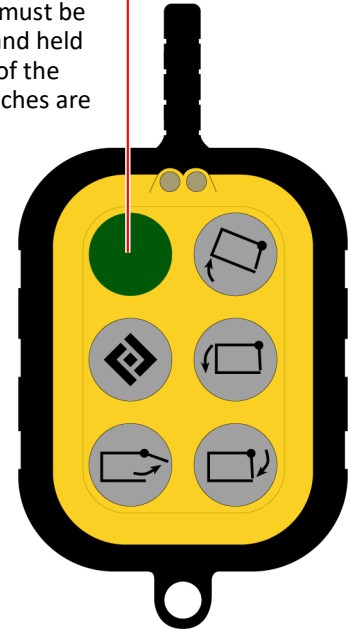
The hopper Raise/Lower and rear door Open/Close switches are located on the remote control box. This is stowed in the cab, between the driver's seat and door and is connected to a socket via a coiled lead.

-  **In the interest of health and safety and to avoid possible damage to the sweeper or adjacent structures, it is essential that the remote hopper/door controls are not activated from within the cab. Always use these controls outside of the vehicle from a vantage point that affords a good view of the sweeper and its immediate surroundings.**
-  **The hopper prop must always be in the deployed position when working under a raised hopper. Failure to do so could result in serious injury.**
-  **The door prop must always be used when working under a raised rear door.**


-  **Hopper Raise** - Press and hold down to raise the hopper.
-  **Hopper Lower** - Press and hold down to lower the hopper.
-  **Rear Door Open** - Press and hold down until the door is fully open (at approximately 90° to the rear face of the hopper).
-  *Ensure that the suction fan is OFF. The door cannot open while the fan is running due to the low pressure created within the hopper.*
-  **Rear Door Close** - Press and hold down until the door is fully closed and the latching cycle has finished.
-  **Option**

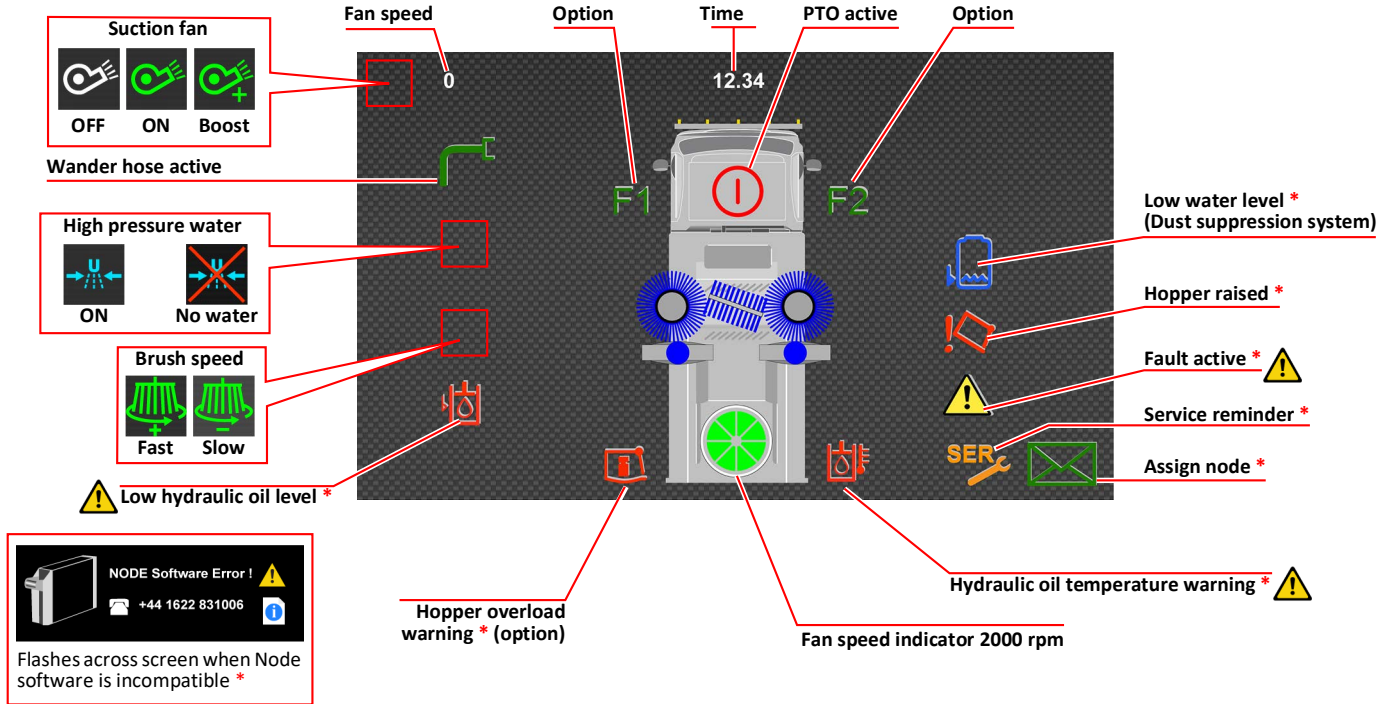
### SAFETY INTERLOCK

This switch must be pressed in and held before any of the control switches are operated.



### The LCD monitor

The sweeping monitor displays information on the current status of the sweeper while it is in sweep mode, by indicating which items of equipment are active, plus other relevant information ie: fluid levels, fan speed and temperatures, it also alerts the user to any warnings by means of appropriate flashing symbols and, when appropriate, a warning buzzer. For warnings identified by , stop and investigate the cause. The accompanying illustration shows the range of information/alert symbols that can be displayed, however it should be noted that warning symbols (\*) only illuminate when a specific condition occurs.



## Additional controls and instruments

### Brush pressure

**⚠** Do not exceed a pressure of 2.5 bar when adjusting brush pressure settings. Failure to comply will result in drastically reduced brush life.

- ① - Air Pressure Regulator - Used to adjust the amount of up/down thrust applied to the brush(es) ⌘.
- ② - Air Pressure Gauge - Indicates the amount of pressure being applied to the brush(es) ⌘.
- ③ - Central Brush (Wide sweep) Pressure Switch - Turns function ON/OFF.
- ④ - Side brush Pressure Switch - Turns function ON/OFF.

⌘ This function is only effective while the relevant brushes are deployed.

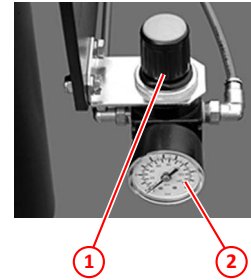
### Controls for overhead wander boom (option)

These are mounted just below the wander boom handle and consist of a button ⑤ for selecting the low-pressure dust suppression water supply.

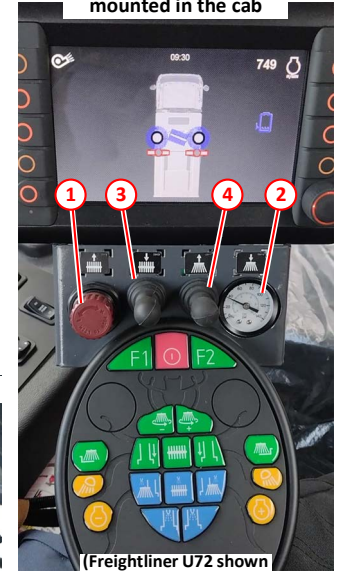
Button ⑥ Boom Boost are not applicable on UniDrive sweepers.

**i** Push button in to activate (button locks-in). Turn in direction of arrows to release.

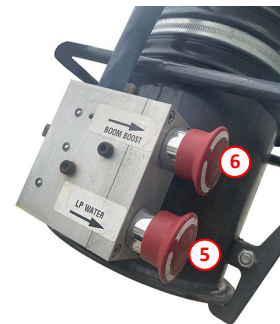
Central brush controls mounted on subframe



Brush pressure controls mounted in the cab



Overhead boom controls






### Auxiliary manual hydraulic pump


 **Never work under a raised hopper or rear door unless the appropriate safety prop is in the deployed position.**

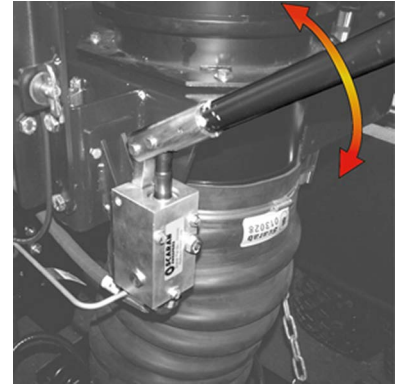
In the event of hydraulic system failure, an auxiliary (manually operated) hydraulic pump is fitted, to enable the rear door and hopper to be operated.

This is located on the left hand side of the vehicle, adjacent to the hopper suction spigot.

The pump handle is normally stowed in the cab.

 *It should be noted that it will require a substantial number of pumping cycles to complete the following operations. The assistance of a second person is highly recommended.*

1. Engine OFF. Park brake ON.
2. Turn ON the ignition (do not start the engine). Select sweep mode  from the main panel.
3. Insert the pump handle.
4. Pressing the required function button on the Remote control and hold, while operating the pump handle.





## Operating Modes

**i** Refer to the health and Safety Information on Page 11.

There are two operating modes. Normal and PTO mode. PTO mode is used when sweeping is required and normal mode would be used when not sweeping and in normal/transit mode.



### Freightliner U72

**i** The PTO can be engaged at anytime the road speed is less than 25 mph (40 km/h) and the engine speed is less than 1000 rpm.

**i** The PTO can be engaged on the move. It is however advisable to slow down to 5 mph (8 km/h) or less when engaging the PTO.

### Engaging PTO

**c** Engine ON and air tanks full before attempting to engage PTO mode.

To engage the PTO press the red button  on the Scarab main control panel. The Scarab LCD screen will indicate the PTO is in gear by the red symbol  shown in the centre of the cab. Also if the Freightliner PTO switch is in the ON position this will also be illuminated.

**i** It is advised that the Freightliner PTO switch is left in the ON position. This switch will not activate or de-activate the PTO but it will illuminate if it is in the ON position when PTO is engaged via the above method.

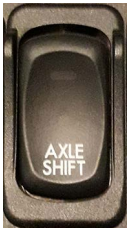
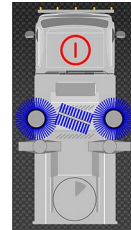
When the PTO is engaged the engine speed will default to a speed of 900 rpm.

The Freightliner is equipped with a 2-speed rear axle. Sweeping can be performed in either high or low rear axle ratio depending on the sweep speed required.

To change the axle ratio the truck gearbox must be in neutral. Change is via the “AXLE SHIFT” switch in the Freightliner dash.

When the switch is illuminated high range/speed is selected.

When the switch is not illuminated low range/speed is selected.



When sweeping it is advised to lock the gearbox in 1st gear.

From the Allison drive control panel, select “D” for drive. The display will show ‘6 1’. Press the ‘-’ (down arrow) button to lock in 1st gear. The display will show ‘1 1’



If a faster sweep speed is required the throttle pedal can be depressed to increase engine speed up to 1800 rpm and hence an increase in road speed.

If a faster road speed is required to, for instance, to cross an intersection quickly, then a higher gear can be selected by pressing the ‘+’ (up arrow) button. Limiting the truck to 2nd gear will ensure the PTO remains engaged. If the truck is allowed to go to 3rd gear it will be possible to exceed 25 mph (40 km/h) at which point the PTO will disengage.

### Disengage PTO

To disengage the PTO, first switch off the suction fan and lift all the brush gear.



Ensure the throttle pedal is not depressed.

Press the red button  on the Scarab main control panel and the PTO will disengage. The PTO engage symbol  on the Scarab LCD screen will not be shown and the Freightliner PTO switch will not be illuminated.


Select the appropriate gear selection and axle selection for normal driving.






## International MV

-  The PTO can be engaged at anytime the road speed is less than 25 mph (40 km/h) and the engine speed is less than 1000 rpm.
-  The PTO can be engaged on the move. It is however advisable to slow down to 5 mph (8 km/h) or less when engaging the PTO.

## Engaging PTO

-  Engine ON and air tanks full before attempting to engage PTO mode.

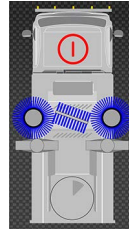
To engage the PTO press the red button  on the Scarab main control panel.

The Scarab LCD screen will indicate the PTO is in gear by the red symbol shown in the centre of the cab . The International dash will illuminate the yellow PTO icon .

When the PTO is engaged the engine speed will default to a speed of 900 rpm.

If the International MV is equipped with a 2-speed rear axle. Sweeping can be performed in either hi or lo rear axle ratio depending on the sweep speed required.

To change the axle ratio the truck gearbox must be in neutral. Change is via the "AXLE RATIO" switch in the International MV dash.



When sweeping it is advised to lock the gearbox in 1st gear.

From the Allison drive control panel, select “D” for drive. The display will show ‘6 1’. Press the ‘-’ (down arrow) button to lock in 1st gear. The display will show ‘1 1’

If a faster sweep speed is required the throttle pedal can be depressed to increase engine speed up to increase engine speed up to 1800 rpm and hence an increase in road speed.

If the gear is not locked then depressing the throttle pedal will cause the gearbox to change up.

Releasing the throttle the gearbox may not change back into 1st gear without depressing the brake pedal to slow the machine down.




If the gearbox is locked and a faster road speed is required to, for instance, to cross an intersection quickly, then a higher gear can be selected by pressing the ‘+’ (up arrow) button.

Limiting the truck to 2nd gear will ensure the PTO remains engaged. If the truck is allowed to go to 3rd gear it will be possible to exceed 25 mph (40 km/h) at which point the PTO will disengage.

### Disengage PTO

To disengage the PTO, first switch off the suction fan and lift all the brush gear.






Ensure the throttle pedal is not depressed.

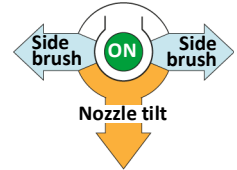
Press the red button  on the Scarab main control panel and the PTO will disengage. The PTO engage symbol  on the Scarab LCD screen will not be shown and the International dashboard will not be displaying the yellow PTO icon .


Select the appropriate gear selection and axle selection for normal driving.




## Sweeping


1. Switch on suction fan  (approx. 2000 rpm) or 'Boost'  (approx. 2200 rpm) as required. Fan speed can be confirmed by referring to the LCD screen.
2. Select the desired configuration of sweeping equipment and water sprays if required, either manually or by pressing the Favourite Settings button  to recall your preferred arrangement. Switch on work lights   if required.
3. Move the multi-function lever (located on the auxiliary control panel) to the ON position to start and deploy the pre-selected sweeping equipment.  
To stop and stow the sweep gear, return the lever to OFF. The sweeping equipment will raise to the stowed position and all water spray jets will stop, this will also occur automatically as soon as REVERSE is engaged, reverting to the original configuration as soon as REVERSE is disengaged.
4. Operate the multi-function lever to swing the side brushes OUT. The multi-function lever can also be used to control nozzle-tilt (*See Page 19 for operating details*).
5. Release the parking brake and slowly depress the throttle pedal to move and start sweeping.






 **Whatever the situation, remember that the rules of traffic and road safety must be observed.**


 **The foot-brake must always be used for emergency braking. Never press brake and accelerator pedals at the same time.**


## Suction fan boost setting

When required, boost settings are available for the suction fan. This increases fan speed and is used when sweeping heavy material. To operate the fan at the Boost settings, press the suction fan 'Boost' switch . *See Page 19.*

## Reverting to normal drive mode

1. Move the multi-function lever (located on the auxiliary control panel) to the OFF position. This will stop and raise all sweeping equipment to the stowed position. The sweeping equipment symbols displayed on the LCD monitor will change back to grey, indicating that they are no longer active.  

-  *For safety reasons, if the multi-function lever is left in the ON position at this point the sweeping equipment will not activate when sweep mode is later resumed. If this occurs the lever will need to be placed in the OFF position when sweep mode is resumed.*
2. Switch the suction fan OFF. 
3. Now disengage the PTO, please refer to the following: -  
Freightliner U72 - Page 26.  
International MV - Page 28.


 **Whatever the situation, remember that the rules of traffic and road safety must be observed.**

 *As soon as you no longer represent a hazard turn off the beacons*

## Discharging the hopper (tipping)

 **In the interest of health and safety and to avoid possible damage to the sweeper or adjacent structures, it is essential that the remote hopper/door controls are not activated from within the cab. Always use these controls outside of the vehicle from a vantage point that affords a good view of the sweeper and its immediate surroundings.**

 **The door safety prop must always be used when working under a raised rear door.**


 **The hopper safety prop must always be in the deployed position when working under a raised hopper. Failure to do so could result in serious injury.**

1. With the vehicle correctly positioned in the discharge area. Proceed as follows:


 **Before raising the hopper, ensure that the vehicle is on firm, level ground and that there are no overhead obstructions.**


2. Engine running. Park brake ON. Vehicle in Neutral. Multi-function lever OFF.

3. Select PTO drive. *See Page 25.*


 *The safety interlock must be pressed in conjunction with the following buttons.*




4. Open the rear door fully. 

5. Raise the hopper fully. 

6. With the load fully discharged, stow the hopper prop and lower the hopper completely. 

 **Before closing the door, ensure that the door seal, and mating faces on the hopper, are free from any foreign matter that might damage the seal or adversely affect the sealing function.**

7. Close the rear door  making sure the locking mechanism has fully engaged.

8. Select manual normal drive mode: *See Page 30,* and move vehicle clear of discharge area.


## Standard wander hose




A wander hose is a large flexible tube/hose that is used to suck up objects in areas that the sweeper is unable to access for example, drain inlets, under benches, etc. The wander hose will be connected to one of the following. Rear door (standard wander hose), rear top panel (rear mounted wander boom) or as an overhead suction boom mounted on top and rear of the hopper in a rotatable turret.

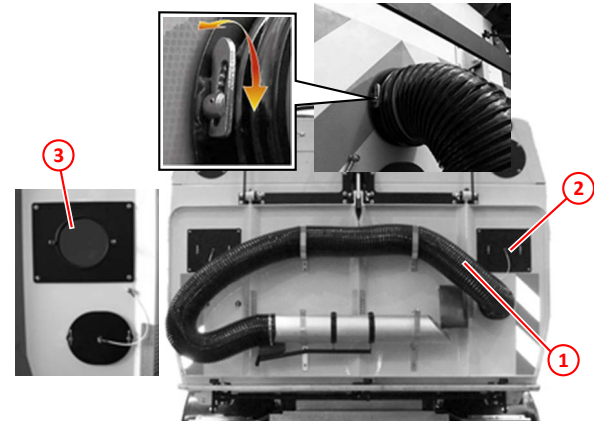
### Using the standard wander hose

**i** Vehicle in PTO drive. Gearbox in neutral. Park brake On. Sweep mode and multi-function lever OFF.

1. Remove the wander hose ① attached to the rear door.
2. Remove either of the blanking plate ② from the rear door aperture and stow on the spare fasteners below.
3. Attach the wander hose over the exposed aperture ③, using the captive fasteners.
4. Suction fan ON. 

**i** For situations requiring maximum suction power, for example when removing stubborn objects etc., select fan 'boost' 

**i** When finished, turn all controls OFF and return the wander hose to its stored position, replace the blanking plate








## Rear mounted wander boom

### Using the rear mounted wander boom


**i** Vehicle in PTO drive. Gearbox in neutral. Park brake On. Multi-function lever ON.

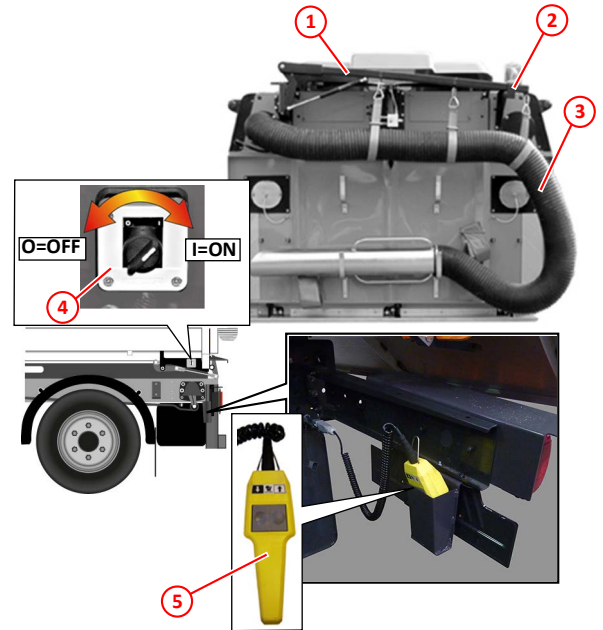
1. Suction Fan ON. 
2. Unhook the wander hose boom ① from its stowed position ②.
3. Demount the hose assembly ③ from its stowage and swing-out the entire assembly to the required position.
4. Turn the wander hose control ④ ON (always mounted on the drivers side).

**i** If water suppression is required place the multi function lever in the ON position.





**i** On vehicles equipped with pneumatic assist, use the UP/Down controller ⑤ (always mounted on the drivers side) to unhook the wander hose.

**i** For maximum suction power, select fan 'boost' .

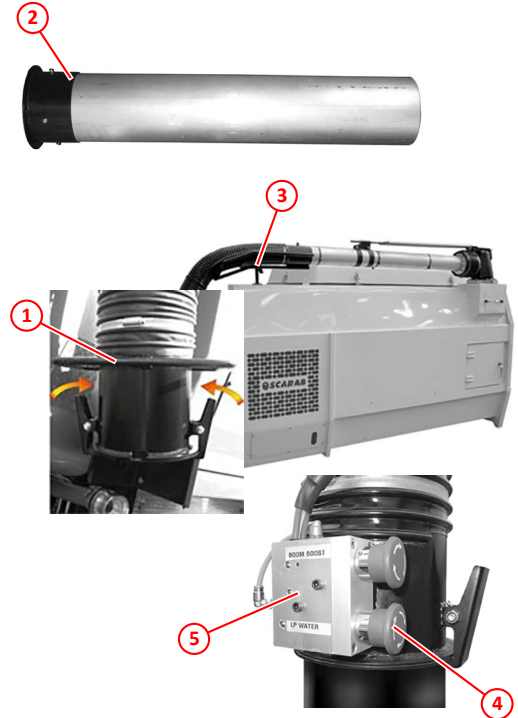


## Using the overhead wander boom

**i** Vehicle in PTO drive. Gearbox in neutral. Park brake On. Multi-function lever OFF.

1. Unlatch the hose assembly ① from its stowage and attach suction tube ② (extra tubes can be added to give greater length).
2. Unhook the overhead boom from its stowed position ③.
3. Suction Fan ON. 
4. Increased suction, use the fan 'boost'. 

**i** If water suppression is required place the multi function lever in the ON position and use button ④ on the hose assembly control block ⑤.



## Dust suppression (water) system

Use of the low pressure water spray, dust suppression, system when sweeping, will reduce the amount of dust generated and ensure a more efficient collection of material. This is because wet material is heavier and will drop more readily from the air stream in the hopper. If swept dry material will pass through the fan filter screen, wearing out the suction fan blades on its way back out to the environment behind you.

### Merlin sweepers

#### Filling the water tank

Attach the appropriate coupling and water hose to the filler aperture ① and fill until the blue float reaches the top of the water level sight tube ② (use clean water).

#### Using the low pressure water system

The low pressure water is used on the, side brush(es), suction tube(s), and central brush (wide sweep). To operate any of these functions the relevant button(s) on the main panel must be selected when in sweep mode.

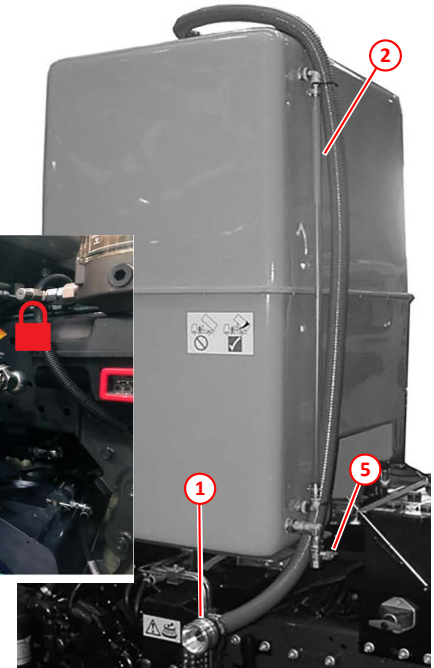
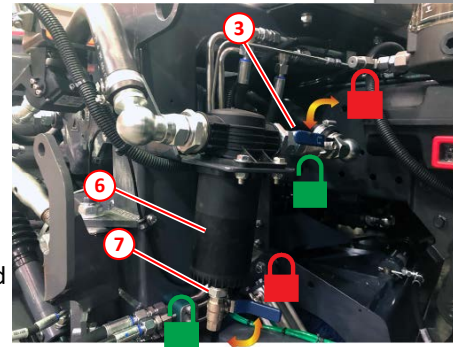
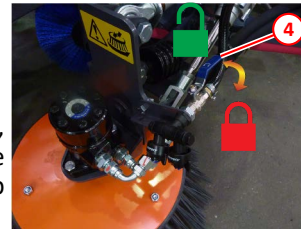
A shut-off valve is positioned between the water tank and the water strainer and must be open when the system is in use ③.

The side brush(es) are fitted with shut-off valves ④.

**⚠ It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.**

#### Fully draining the system

Open tank drain valve ⑤. Open low pressure water shut off valve ③. Open water strainer valve ⑦. Open all brush shut-off valves ④. When the water has stopped draining from the various taps. Shut valve ③ and remove the water strainer ⑥. Start the engine and put into sweep mode, activate all the low pressure water functions on the main control panel. When the water has stopped flowing from the spray nozzles, turn off all the low pressure water functions from the main control panel and exit from sweep mode. Switch the engine off.



## Magnum sweepers

### Filling the water tank

Ensure that the water tank to water strainer valve ① is in the shut position and any other tank drain valve ② is shut. Attach the appropriate coupling and water hose to the filler aperture ③ and fill until the blue float reaches the top of the water level sight tube ④ (use clean water).

### Using the low pressure water system

The low pressure water is used on the, side brush(es), suction tube(s), and central brush (wide sweep). To operate any of these functions the relevant button(s) on the main panel must be selected when in sweep mode.

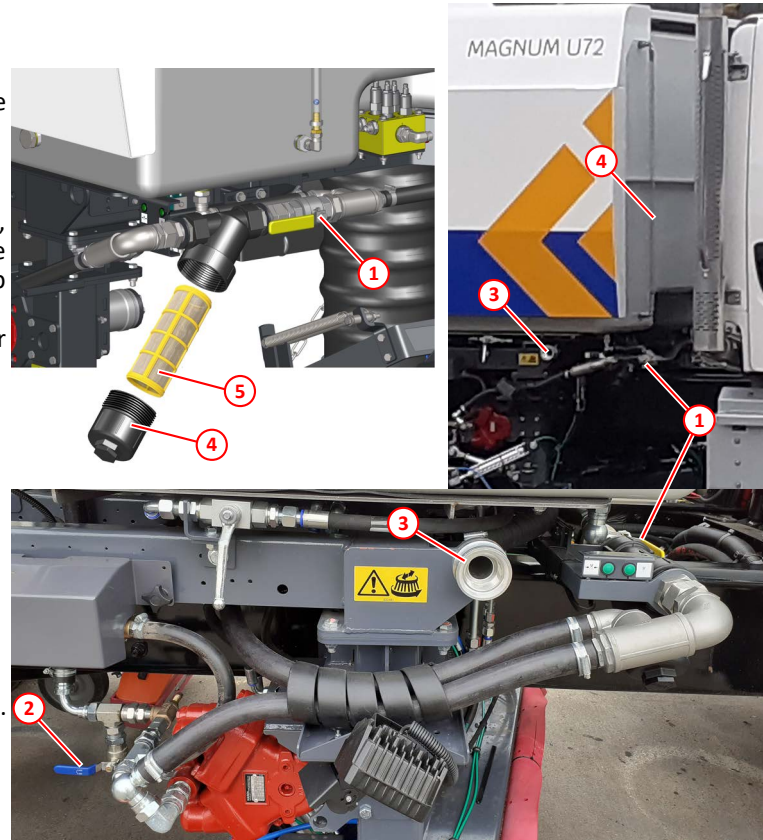
A shut-off valve ① is positioned between the water tank and the water strainer and must be open when the system is in use.

Each side brush is fitted with a shut-off valve and should be opened when that brush is being used if dust suppression is required.

**⚠** It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.

### Fully draining the system

Open tank drain valve ②. Open water tank to water strainer valve ①. Open all brush shut-off valves. When the water has stopped draining from the various taps. Shut valve ① and remove the water strainer bowl ④ and filter ⑤. Start the engine and put into sweep mode, activate all the low pressure water functions on the main control panel. When the water has stopped flowing from the spray nozzles, turn off all the low pressure water functions from the main control panel and exit from sweep mode. Switch the engine off.






## Using the high pressure water system (option)

- ⚠ High pressure water can be hazardous, always wear goggles or suitable eye/face protection. Exercise extreme care when using the lance, do not direct the jet at other people or electrical connections. Failure to comply can result in serious injury.**

The high pressure water is used on the following options:

- Front spray bar ①.
- Suction tube boost spray bar ②.
- Suction fan wash assist\* ③.
- Hand lance and retractable hose\* ④. See page 38.

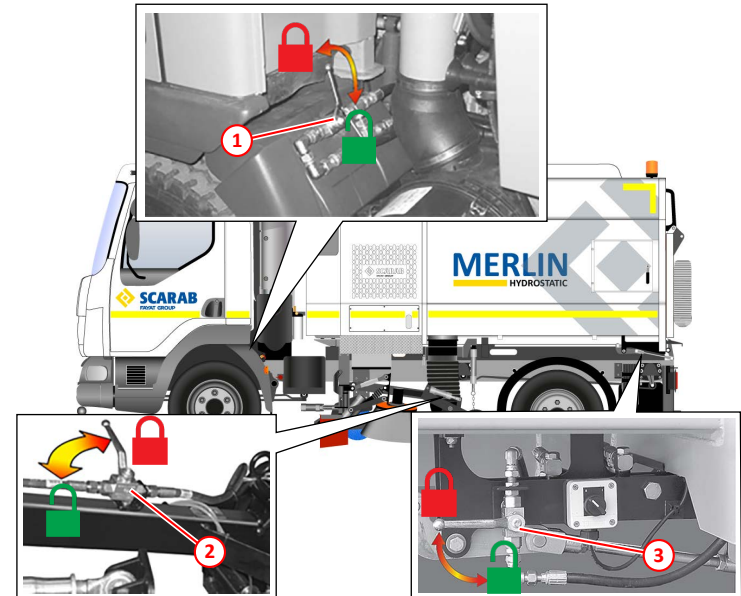
To operate any of the above options the vehicle must be in PTO drive, with sweep mode ON ①. Press the high pressure water switch  on the auxiliary control panel and open the appropriate valve(s) for the function(s) required.

**i** Fan wash assist is only an aid to fan cleaning. It is recommended that this option is used immediately following a days sweeping. The fan should always be cleaned in accordance with the recommended operators routine maintenance.

**⚠ Due to the possibility of excess water and loose material being ejected via the hopper hood when the suction fan is restarted, this procedure should only be carried out at an appropriate location.**

\* These options normally fitted on the drivers side.

Valves for the various options



### Hand lance detergent option

1. With the hand lance in use, check that the detergent container **5** has sufficient fluid.
2. Turn on the control valve **6**.
3. Adjust the spray pattern valve **7** on the hand lance to achieve desired effect.

### Retractable hose

The hand lance is attached to a 13 metre long rubber hose fitted to a hose reel **8**.

When extending the hose, a ratchet mechanism allows the reel to lock in place. Further extending past the ratchet allows the reel to retract.

The position of the hose reel and hand lance is determined by the machine specification.

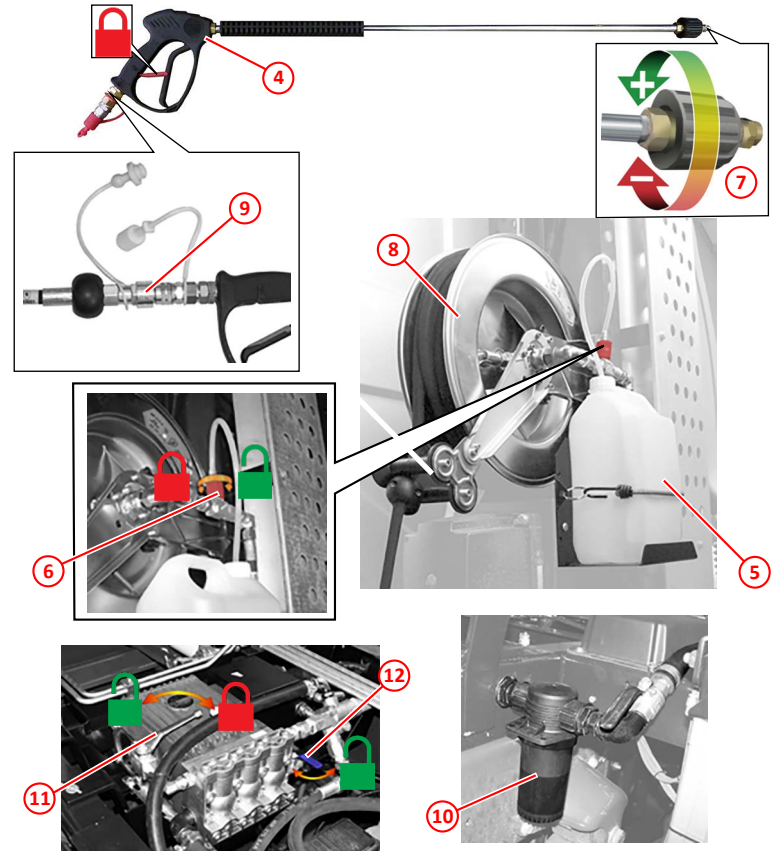
In certain cases the hand lance is fitted with a quick release coupling **9**.

**⚠** It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.

Please see page 39 if your machine has the water purge system.

**Draining the system** - See Page 35 and 36. Remove water strainer **10**. Open pump drain valves **11** and **12**.

**⚠** The water pump should NEVER be permitted to run dry.



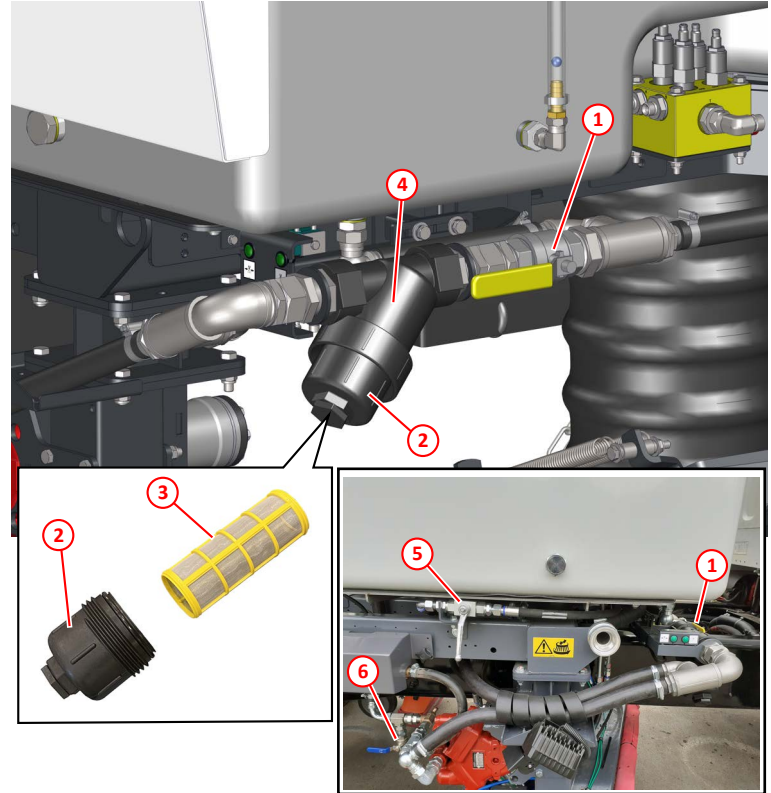


## Draining the water system with air purge

**⚠** It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.

The procedure to drain the water from the system is as follows:

1. Gearbox in neutral, park brake on and preferably to have the engine switched off. If performing an air purge then engine can be left running.
2. Close water feed valve ①.
3. Remove bowl ② and filter ③ from water strainer ④.
4. Clean bowl and filter.
5. Open side brush valves and any other low pressure water valves.
6. Open high pressure water valve(s) ⑤.
7. Open water feed valve ①.
8. Open tank drain valve ⑥.
9. Wait until the water has stopped draining out of the water strainer and tank drain.
10. Close all valves that have been opened.
11. Refit filter and bowl to the strainer.

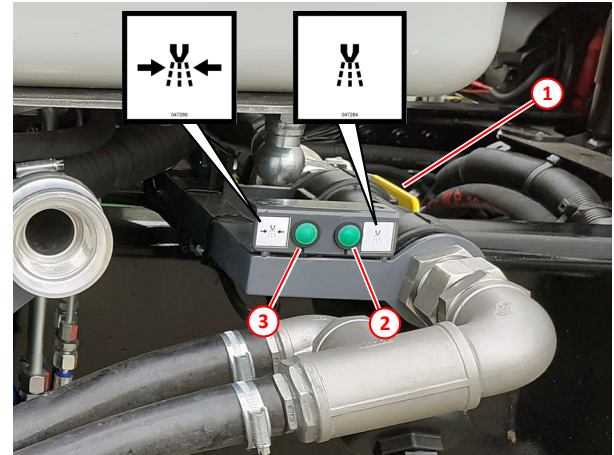


### Using the air purge

An air purge system is fitted to assist with removing water from the system, this should always be used if the temperature is expected to fall below 0°C. It may be required to have the trucks engine running to keep the air pressure up.

**⚠ It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.**

1. Carry out “Draining the water system with air purge” on page 39 before continuing with this procedure.
2. Ensure the gearbox is in neutral, park brake on and the engine is running.
3. Ensure the water feed valve ① is closed.
4. Ensure all low pressure water jet manual taps are in the open position.
5. Press and hold the Low Pressure Purge button ②, the buttons are located beneath the water tank on the left hand side. The low pressure water pump and water valves will operate and air will be pumped through the system.
6. When the water jets blow clear air through them, release the Low Pressure Purge button ②.
7. Return all opened low pressure taps to their closed position.
8. Open all high pressure manual taps, the number fitted will be dependant on what options are fitted to the machine.
9. Press and hold the High Pressure Purge button ③. The high pressure pump will run for a limited time to clear the pump itself of water but, air will continue to be pumped through the system as long as the button is depressed.
10. When the high pressure system blows clear air, release the High Pressure Purge button ③.
11. Close the high pressure manual taps that have been opened.
12. Pull out the hose from the hose reel and attach the hand lance, if not attached.
13. Pull and hold the trigger on the lance and press the High Pressure Purge button ③.
14. When the hand lance blows clear air, release the trigger and High Pressure Purge button ③.
15. Remove and stow the hand lance and recoil the hose reel.




Air pressure can be monitored by looking at the gauge on the regulator unit which is located next to the pneumatics cabinet. If the pressure drops below 4 bar, release the purge button and wait for the air pressure to build back up to 8 bar, now press the purge button again.




## Clearing a blockage in the suction path

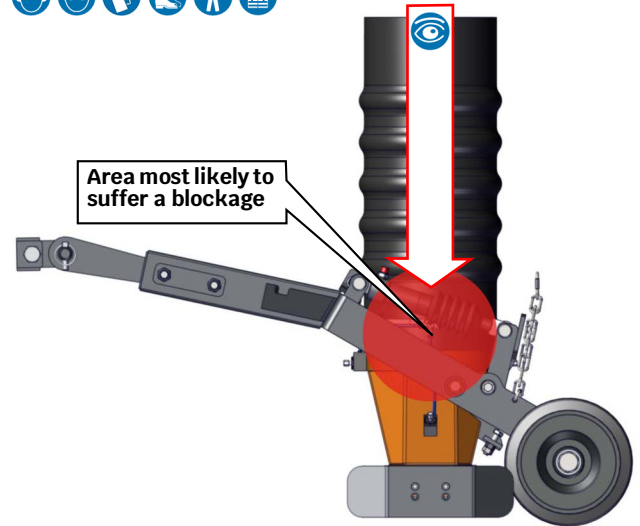
A blockage in the suction path will be indicated by a trail of material behind the vehicle.

Use the following instructions and the diagram opposite to locate and remove the obstruction:-

1. With all sweep equipment retracted and stowed.
2. Raise the hopper , deploying the safety prop. Stop engine. Remove ignition key.
3. Visually check the suction path to determine the nature and location of the blockage. If no blockage is present, further investigation of the suction system will need to be carried out.
4. If the blockage is still present, use a suitable implement (a stout length of wood is ideal), to remove the obstacle by pushing it downwards.

 **Always be aware of the risk from sharp objects and never place your hands into the blockage, even when wearing gloves. Exercise extreme caution when handling any items removed from the suction system, keeping such activities to the absolute minimum.**

5. Stow the hopper prop and lower the hopper  but do not start the suction fan at this stage.
6. Move the vehicle sufficiently to expose the cause of the blockage. Stop the vehicle, apply the parking brake and remove the ignition key. Carefully isolate the blockage and if appropriate, place it in the hopper via the side loading hatch.
7. Resume sweep mode. Lower the suction box and switch on the fan. Ensure the suction is correctly functioning.
8. Return to the start of the trail created by the blockage and continue sweeping.



## Recommended operator's routine maintenance



It is important that the following routine maintenance procedures are carried out as directed. This will help to ensure that your sweeper performs at the optimum level of safety and efficiency. Refer to the paragraphs immediately following this schedule and to the Table of Contents for more detailed information. For chassis servicing/maintenance, refer to the chassis manufactures information.


Daily Before Use Maintenance procedures
Check vehicle/body for safety. All lighting equipment, tyres, fuel, oil, coolant, brake fluid, windscreen wash and water tank level.
Check hydraulic oil level and inspect system for signs of leaks. Check oil cooler is clean.
If vehicle not previously used by YOU, check suction fan is clean.
Check brushes/skirts for wear or damage. Remove entangled items, e.g. string or strapping. etc.
Check suction nozzle flaps for damage/correct ground clearance.
Check water spray jets for blockages.
Check that all equipment is securely stowed and brushes are retracted.


Daily After Use Maintenance procedures
Wash vehicle, particularly hopper screen, surrounding ledges and area above. Leave hopper door partially open, to allow air to circulate.
Wash oil cooler, ensuring that the fins are clean.
Lubricate as appropriate, all brush links, pivot and nozzle wheel.
Remove/clean the L-P and H-P water filter elements.

Weekly Maintenance procedures
Clean the suction fan thoroughly, using the scraper provided and high pressure water (See Page 44).
Conduct a thorough inspection of the fan assembly to verify its condition. Report any defects (See Page 44).
Grease hopper ram (Top and bottom).
Visually check entire machine for wear/damage.
Check wiring and hoses for security of attachment and signs of wear and damage.
Check wear in suction tubes and deflectors in hopper.
Check seals on hopper door, side hatches and suction tubes.
Check oil level in H-P pump, top-up if needed.
Grease all points (See Page 50).
Check subframe to chassis fixing brackets

Other Maintenance procedures
Lithium grease the low pressure pump after every 50 hours of the pump running and/or every service. 10 grams or 0.4oz (10 pumps).

 **It is vital that the water system is drained totally if the air temperature is expected to fall to 0°C or below.**

 *In frosty weather leave the hopper slightly raised with the rear and side door partially open.*


 *The foregoing are general recommendations only. Requirements vary from territory to territory and depend on vehicle usage/operating conditions.*

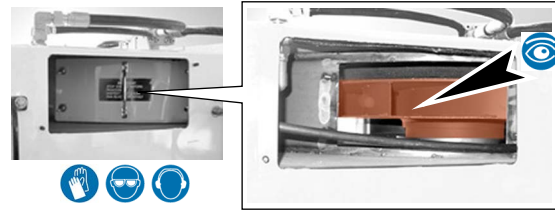
*IF IN DOUBT, CONSULT YOUR NEAREST DEALER.*

## Key maintenance procedures




### Cleaning the suction fan and screen

- ⚠ Failure to comply with the following could result in serious injury.**  
**Before working on the machine position it on firm, level ground and apply park brake.**  
**The fan is an extremely heavy rotating mass. never attempt to slow or stop its rotation by using the hands or by inserting any item into the fan chamber, even at low speeds.**  
**Never work under a raised rear door unless the prop is in the deployed position.**

1. Turn engine OFF. Remove Ignition key. Use a suitable platform to enabling you to reach the area above the rear door.
2. With the fan stationary, remove the outer and inner inspection covers from the hopper to expose the fan.
3. Using the special scraper, thoroughly clean all parts of the fan. A steam-cleaner or high-pressure water from a remote source will greatly assist in cleaning severely contaminated fans.
4. Refit the inspection covers and open the rear door .



Please pay particular attention to inner curve of blade and also the centre of the unit where dirt accumulates around the hub area.

4. Lower the screen. Wash the screen using steam or high-pressure water. Raise the screen and close the rear door. .
- ⚠ Loose particles from the cleaning process can be ejected via the hopper cover when the fan is restarted, ensure that all personnel are clear before restarting.**
5. Start engine. Select sweep mode . Fan ON .
6. With the rear door shut, direct additional water on to the screen below the fan inlet cone, from an open side-access flap, until only clean water is expelled from the fan casing.



## Hydraulic oil tank

**⚠ The hopper prop must always be in the deployed position when working beneath a raised hopper. Failure to do so could result in serious injury.**

**i** It is advisable to top-up the Hydraulic oil level when the system is cold.

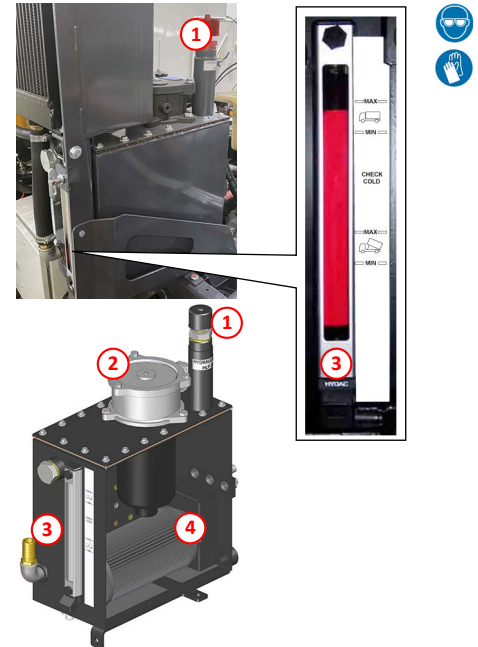
**i** The hydraulic oil tank gauge is fitted with low level sensor. If the oil level drops too low the brush gear will be lifted and a warning symbol will be displayed on the LCD screen and a buzzer will sound.

## Topping-up

1. Raise the hopper fully. 
2. Using the appropriate size spanner, remove the filler cap with the breather **①**.
3. Top-up with HPL 32 or an equivalent hydraulic oil to the appropriate level. **i** Pay particular attention the hopper orientation as indicated on the level label when filling.
4. Replace the filler cap.
5. Stow the hopper prop and lower the hopper completely. 

## Oil tank components

- ①** - Fill/breather cap
- ②** - Return filter
- ③** - Sight glass
- ④** - Suction filter



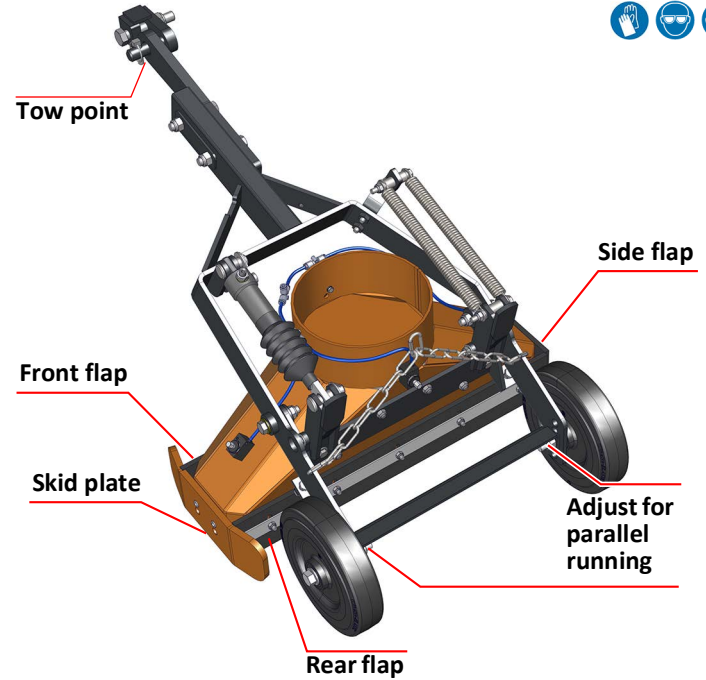
## Suction nozzle clearances

Inspect the suction nozzle flaps to verify that they are in good condition and do not show excessive wear. Adjust as necessary to achieve the correct flap to ground clearances.

The factory settings are:

- Side Flap = 15 mm
- Front Flap = 20 mm
- Rear Flap = 15 mm

**i** *These clearances are based on the factory set-up. For some operating conditions, it might be found that, alternative clearances are preferred.*



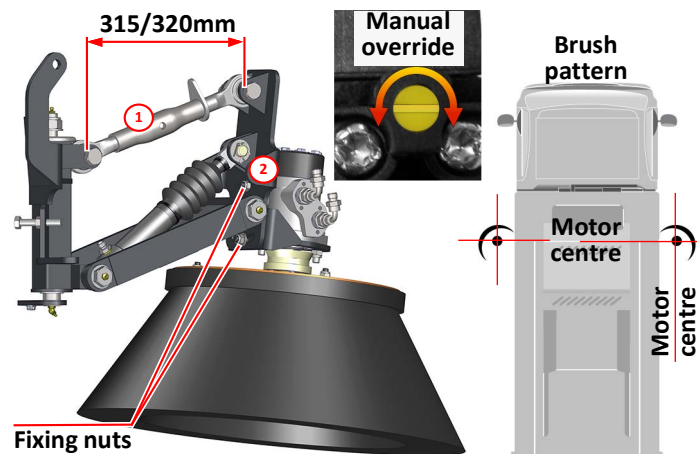
### Side brushes

**⚠ Do not attempt to alter brush settings while brush is rotating.**

An effective brush set-up ensures good sweeping performance. The following settings produce excellent results in most conditions. Experience will determine if other settings are better suited to specific conditions.

**⚠ Before proceeding ensure people and objects are clear of the brush area.**

1. Vehicle stopped, park brake ON, sweep mode ON, activate the desired brush(es) in their working positions.
2. Switch OFF ignition and remove the key.
3. Locate the appropriate valve(s) in the pneumatic cabinet and activate the manual override to allow the brush(es) to extend.
4. Adjust the top link ① and/or the motor plate ② until the brush is at the correct contact with the road surface. Re-tighten any items slackened during adjustment. Motor plate adjustment not required if fitted with brush tilt option.
5. Re-start vehicle, stow all sweeping equipment activated for adjustment.



### Side skirts

The side skirts that are adjacent to the side brushes need to be adjusted so that they are just clear of the ground. When the brushes are in the deployed position.

It may be necessary to trim the lower edge of the skirt with a sharp knife and straight edge for it to be parallel to the ground.

To adjust the side skirts loosen the nuts on the clamp that hold the side skirts in place.

1. If the skirts are slotted then slide the skirt on the slots to achieve desired height from the ground.
2. If the side skirt has holes then you will need to remove the nuts and the clamp holding them in place and move the skirt to another set of holes, then re-attach the skirt clamp and nuts.

Tighten any loosened nuts.

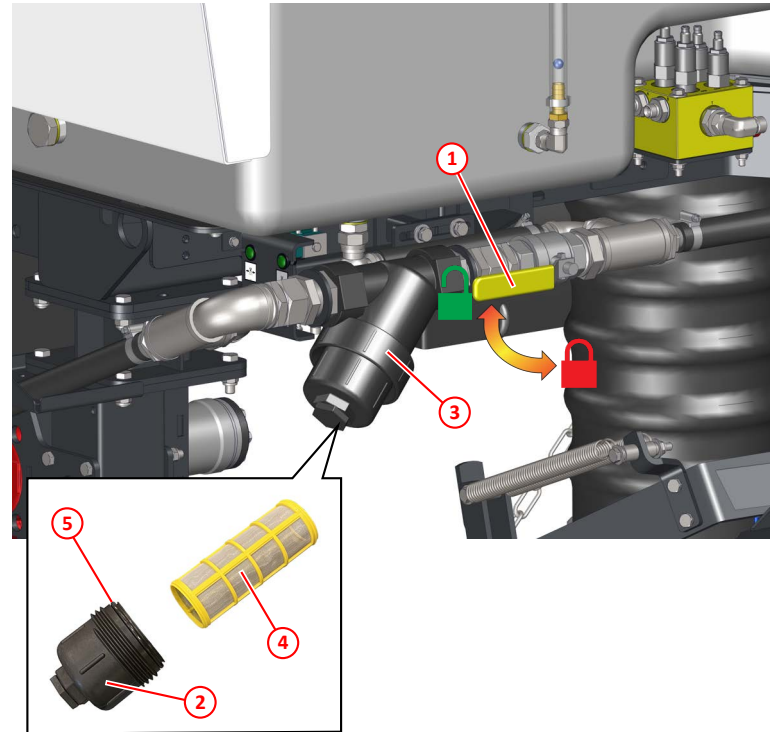
## Removing and cleaning the water filter element, Magnum

The water system is fitted with a single large flow capacity strainer to ensure that foreign matter does not enter the pumps.

The following steps detail the recommended cleaning procedure.

**i** It will be necessary to place the shut-off valve ① in the closed position.

- 1.
2. Unscrew the filter bowl ② clockwise from the housing ③ and remove the element ④.
3. Wash out the element with clean water or replace the element if it is too contaminated.
4. Before re-assembling the unit, apply a small amount grease to the O-seal ⑤ to ensure a water-tight fit for the filter bowl.
5. Refit the element and filter bowl.
6. Return the shut-off valve to the ON position.



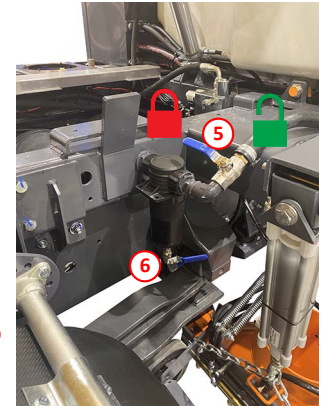
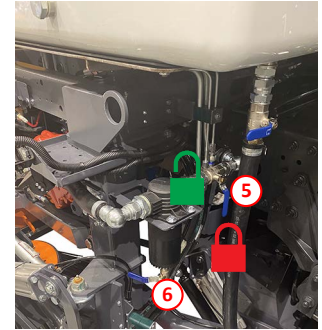
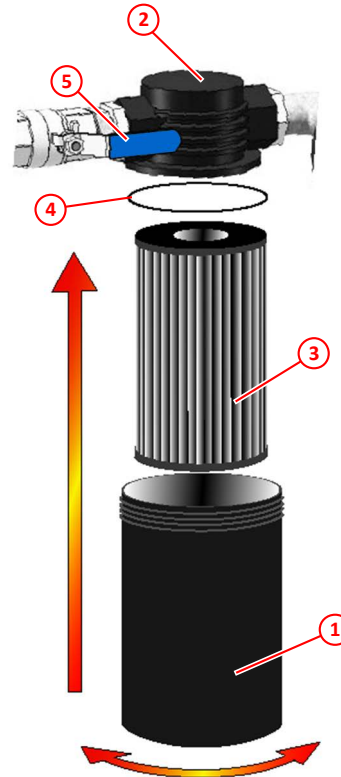


### Removing and cleaning the water filter element(s), Merlin

Both the low-pressure and, if fitted, the, high-pressure water pump are fitted with strainers to ensure that foreign matter does not enter the pump. The following steps detail the recommended cleaning procedure.

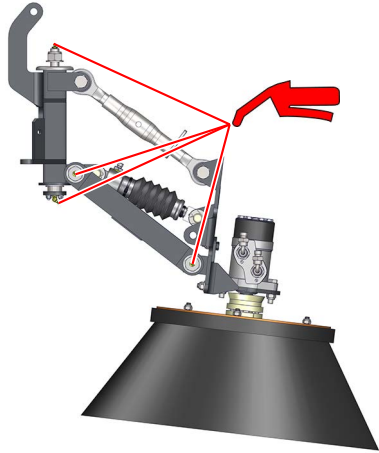
**i** It will be necessary to place the shut-off valve(s) ⑤ in the closed position.

1. If fitted open the valve ⑥ at bottom of filter bowl to drain water.
2. Unscrew the filter bowl ① clockwise from the housing ② and remove the element ③.
3. Wash out the element with clean water or replace if too contaminated.
4. Before re-assembling the unit, apply some grease to the O-seal ④ to ensure a water-tight fit for the filter bowl.
5. Refit the element and filter bowl. Close valve on bottom of filter bowl if fitted.
6. Return the shut-of valve(s) to the ON position.

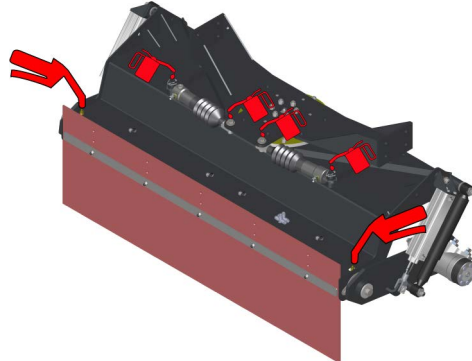


## Manual greasing and lubrication

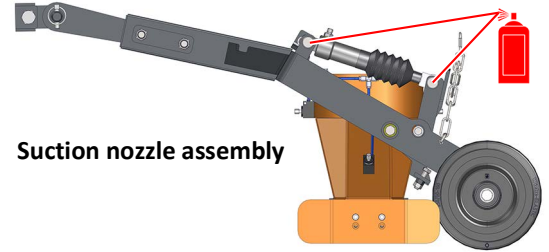
Carry out manual greasing in accordance with the appropriate schedule on page 42 and by referring to the accompanying diagrams shown here.



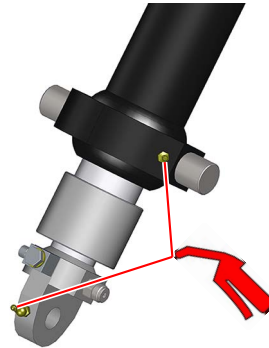
Side brush assemblies



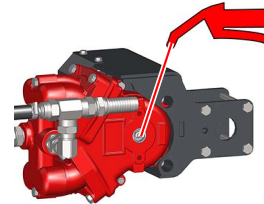
Central brush (wide sweep)



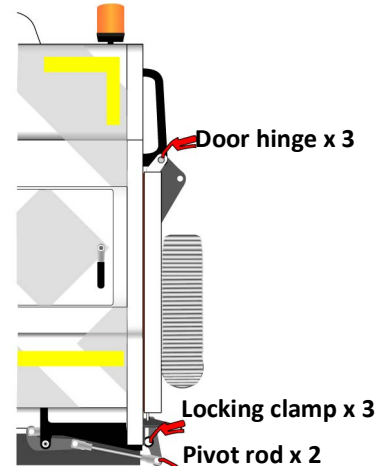
Suction nozzle assembly



Hopper ram



Low pressure water pump



Rear door

Door hinge x 3

Locking clamp x 3

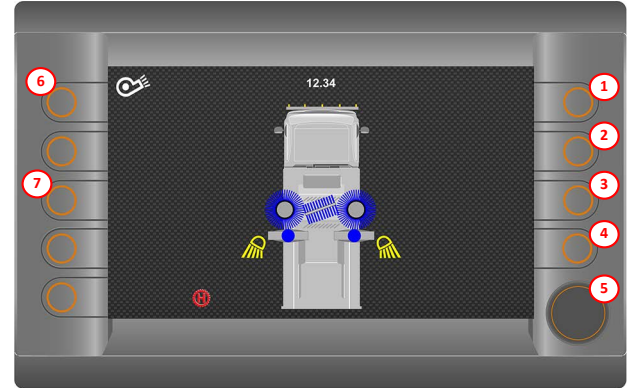
Pivot rod x 2

## LCD monitor - Options screen







To Access the option menu from the start-up screen press button ②

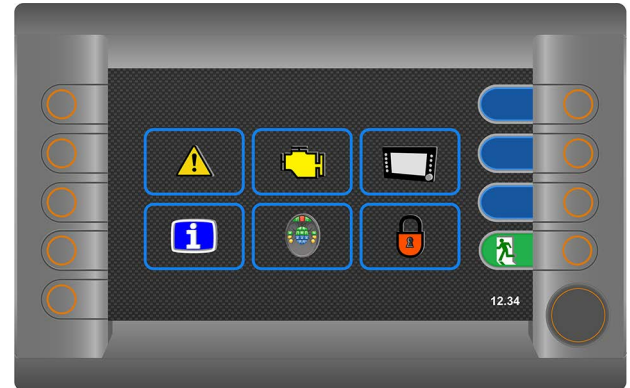
### Button function

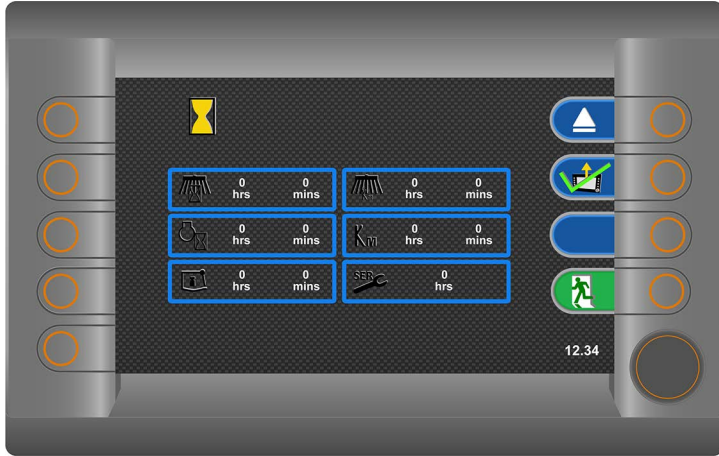
1. Display: Press to change background colours (black/white).
2. Menu: Press to access option screen mode (illustrated).
3. Hours: Press to view hours logged.
4. Return: Press to return to previous screen.
5. Encoder: Turn to highlight required option, press to enter. Used in all screen modes. Press to display side tabs from the sweeping mode screen.
6. Camera: Press to enable in forward drive. (rear view only)
7. Hopper raise/lower and rear door open/close warning buzzer: Press to disable.



### Option menu descriptions

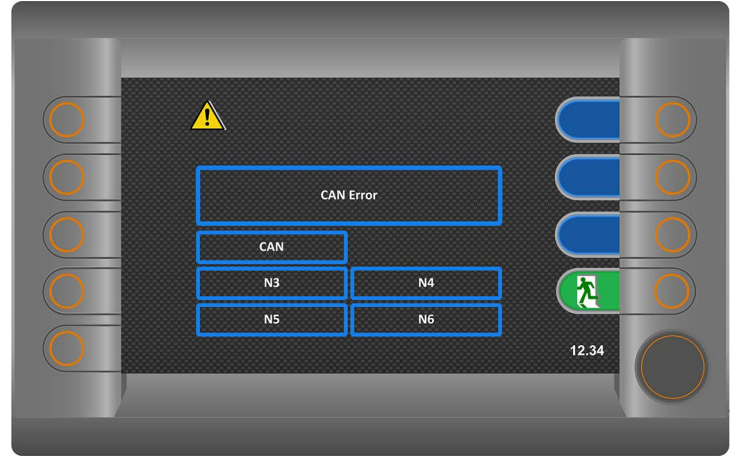
-  Driver's fault codes
-  EDC
-  Screen settings
-  Information
-  Button check
-  CAN menu (Password protected)





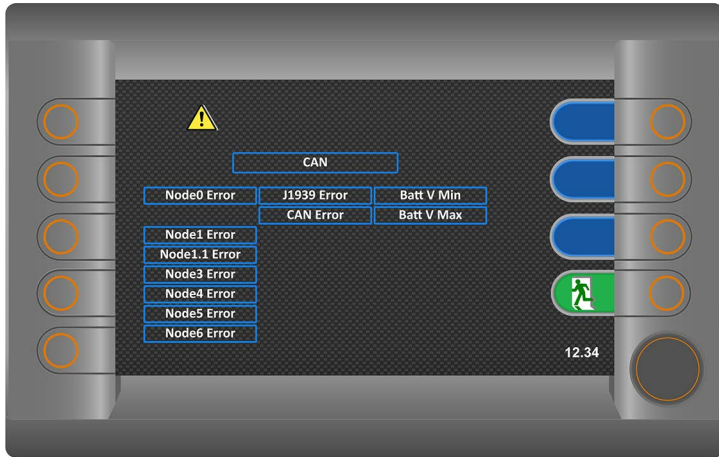
### Hours worked

Displays the working time of various functions.  
Service Hours only display when activated.



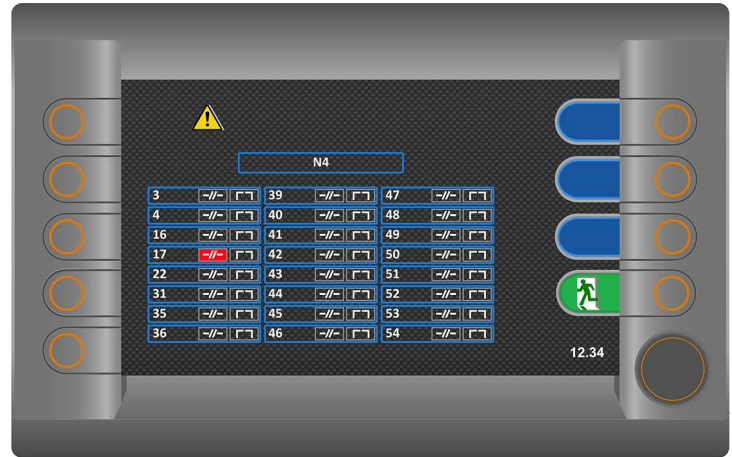
### Driver fault codes

Rotate the encoder to highlight either the CAN or desired Node.  
Press the encoder to enter.



### CAN error screen

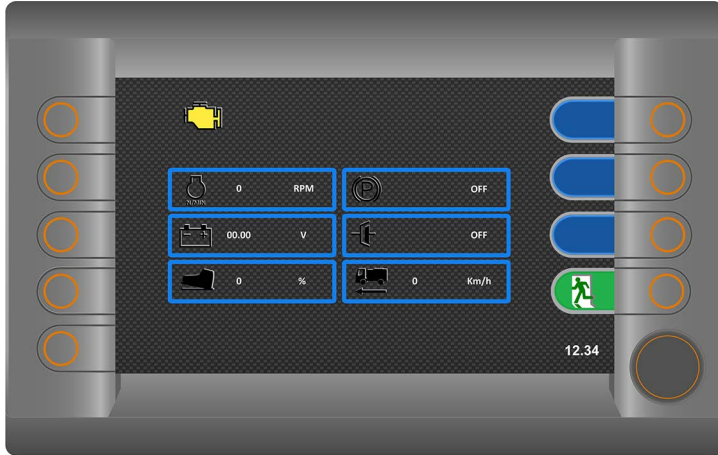
Identifies location of system errors.  
Highlighted in red when active.



### Driver fault codes

Entering a Node screen allows Pin-Contact view.  
Pin numbers with an active fault are highlighted in RED.

- /- = Open Circuit
- = Short



### EDC

Displays the following current conditions:

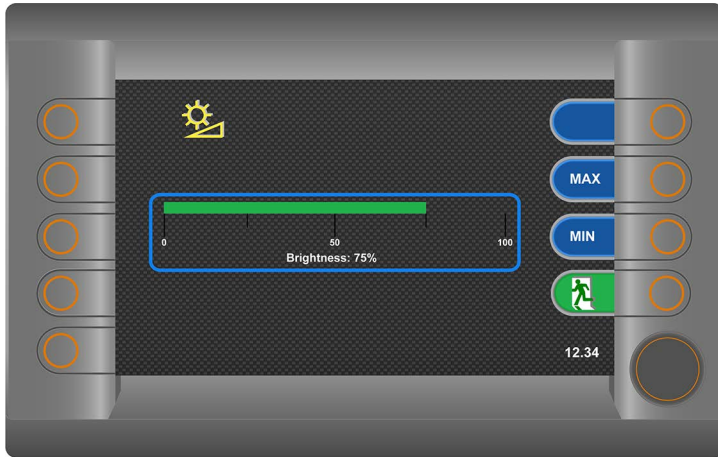
- *Engine Speed*
- *Battery Voltage*
- *Pedal Position*
- *Parking Brake Position*
- *Clutch Position*
- *Road Speed*



### Screen Settings

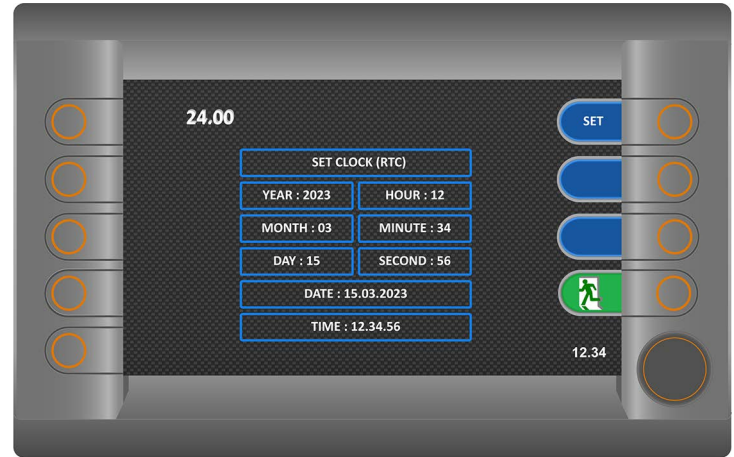
Rotate the encoder to highlight the desired panel and press the encoder to enter the setting screen.





### Screen brightness setting

Rotate the encoder to adjust the screen brightness (2% increments).  
 Pressing the MIN button adjusts the brightness to 10%.  
 Pressing the MAX button adjusts the brightness to 100%.



### Time/date setting

Rotate the encoder to the desired panel and press. Rotate to the correct, Year, Day, Hour, etc and press the set button.  
 Repeat above step as required.

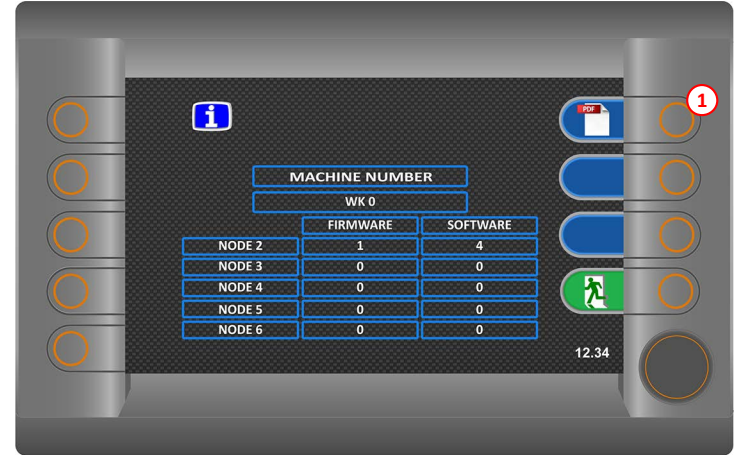


### Rear camera

Enable/disable rear camera. When fitted.

A green tick displays in the centre of screen icon when camera is activated.

NOTE:- This function allows rear viewing when the vehicle is in forward drive. When reversing the rear view screen activates automatically.



### Information

Displays current Node program version.

Press button ① to access the PDF viewing screen. Follow the on screen directions.

**⚠ Only to be used when vehicle is stationary.**

NOTE:- On exiting the PDF viewer ignition must be cycled.





### Button checks

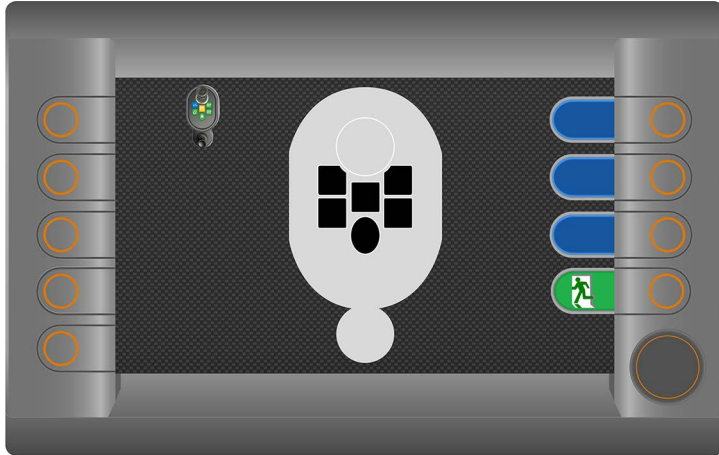
Highlight the appropriate panel and press the controller.



### Main control panel button check

Press the appropriate button on the main control panel. As each button is pressed the corresponding graphic will illuminate.

A beep will sound if the function is fitted.



### Auxiliary control panel button check

Use the main control panel instructions to test buttons and joystick.







**Scarab Sweepers Limited**  
**Pattenden Lane, Marden, Kent TN12 9QD**

Telephone: 01622 831006  
e-mail: [scarab@scarab.fayat.com](mailto:scarab@scarab.fayat.com)

Part No. SCAZ038022 3.0.00

International: +44 (0)1622 831006  
Web site: [www.scarab-sweepers.com](http://www.scarab-sweepers.com)