

SH SOLAR E and D - Instructions for use



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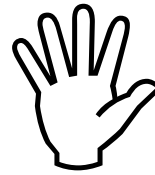
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Symbols used to mark instructions



Before using the high-pressure washer, be sure to also read the enclosed operating instructions and keep them within reach at all times.



This symbol is used to mark safety instructions that must be observed to prevent damage to the machine and its performance.



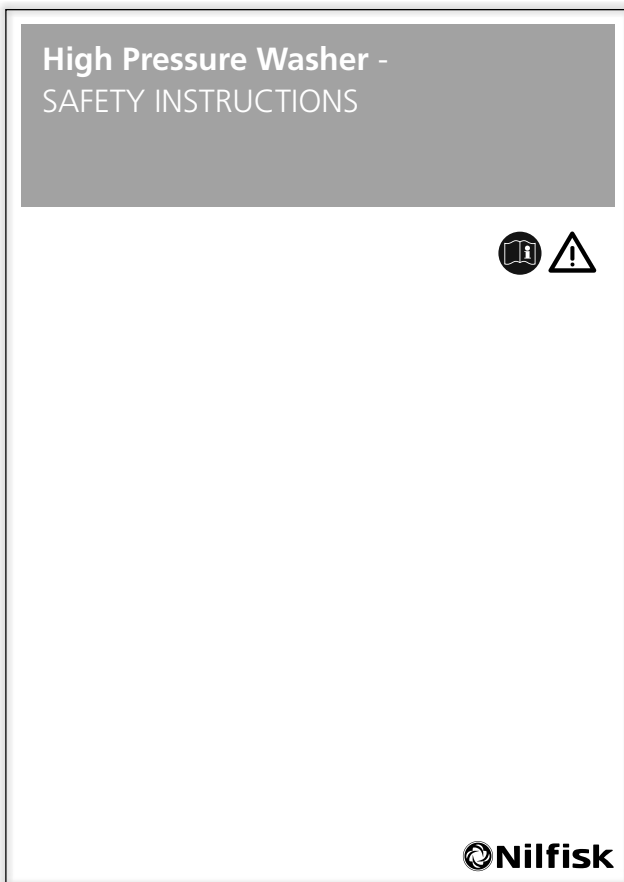
Safety instructions in these operating instructions which must be observed to prevent risks to persons are marked with this danger symbol.



This indicates tips and instructions to simplify work and to ensure safe operation.



1 Safety Precautions and Warnings



2 Description

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2.1 Application

This high pressure hot water washer has been developed for stationary installation and professional use within:

- agriculture
- light industry
- transport
- building and construction
- service

Section 4 describes how to use

the high pressure hot water washer.

Only use the high pressure hot water washer for purposes described in this manual.

The safety precautions must be observed to prevent damage to the machine, the surface to be cleaned or severe personal injuries.

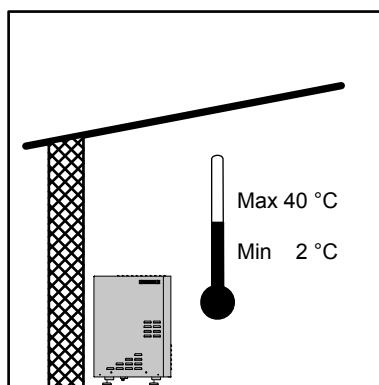
2.2 Operation elements

See illustration at the end of the manual

- 1 High pressure outlet (quick coupling, male)
- 2 Main switch
- 3 Start push button (illuminated, green)
- 4 Stop push button (illuminated, red)
- 5 Heating ON/OFF push button (illuminated, yellow)
- 6 Pressure gauge
- 7 Water inlet (quick coupling, female)
- 8 Thermostat (temperature adjustment)
- 9 Electric cable
- 10 Inspection window (hour counters, error messages)
- 11 Overheat fuse - resetable
- 12 Chimney

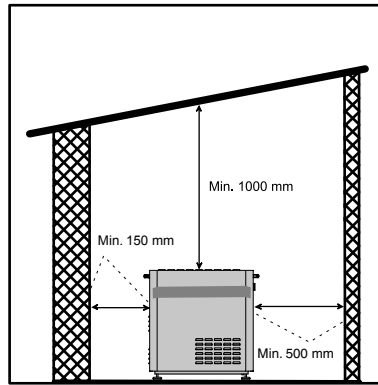
3 Installation

3.1 Temperature conditions



The machine should be installed in a frost-free room. This applies to pump as well as pipelines incl. of outlet points. If connected to outdoor outlet points it should be possible to close and empty that part of the line which is exposed to frost. The maximum ambient temperature for the machine is 40°C.

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3.2 Condition of distance

In consideration of the cooling system of the machine and the accessibility of service, there must be free wall space on both sides of the machine. To the right 500 mm at a minimum and to the left 150 mm at a minimum. To the ceiling there must be at least 1000 mm and from the rear point of the machine to the back wall there must be at least 100 mm. There must not be any other objects in this area either, such as pipes etc.

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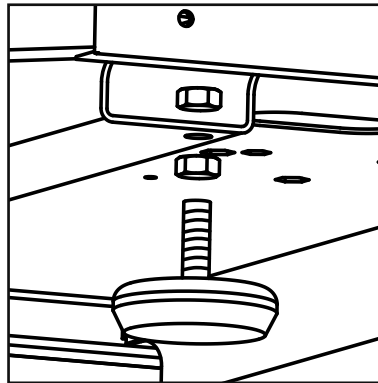
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3.3 Mounting of feet and levelling of machine

The machine is delivered without feet mounted. Loosen the machine from the pallet and

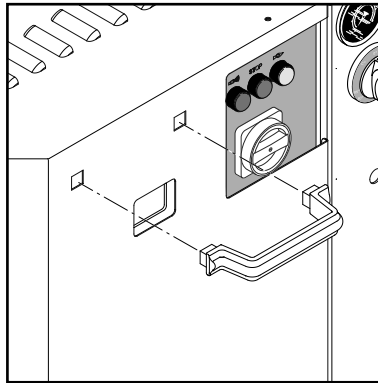
mount the 4 feet by fastening them to the flange underneath the machine by means of a 19 mm open-end wrench.



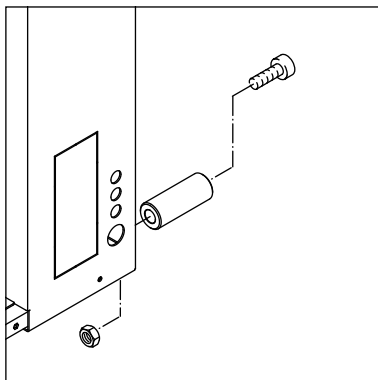
Place the machine on a plane floor.

To level the machine, loosen the lock nut on the appropriate feet and adjust the height by screwing the foot up or down.

Next cross-tighten the lock nuts around the flange. It is important that all 4 feet are in contact with the floor.

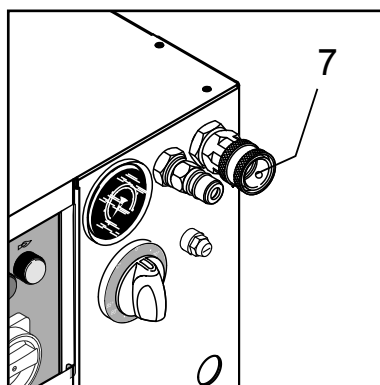
3.4 Mounting of handle

Mount the enclosed handles on the machine by pressing them into the suitable openings in the cabinet.

3.5 Mounting of spacers

Mount the enclosed spacers at the back of the machine.

3.6 Water connection



The water connection is made through a flexible hose connected to the quick coupling on the water inlet (7) of the machine.

Make sure that the supply hose is suited for the purpose (temperature and flow rate). If in doubt, contact your Nilfisk representative.

The connection can be made to a public drinking water supply network or a private water supply. A shut-off cock should be mounted on the water supply network in the immediate vicinity of the machine. Make sure

that the water supply is within the following specifications and that the water does not contain particles such as floating sand. Min. water inlet pressure: 1 bar (at the required flow rate of the machine - see data plate). Max. water pressure: 10 bar Max. water inlet temp. (EH/GH): 85°C. Max. water inlet temp. (D/G): 30°C.

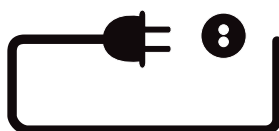
All machines feature a water tank, and no further protection against back-flowing water into the supply network is required. The machine complies with EN 1717.

If there is a risk of floating sand or other impurities in the inlet water, a sand filter (50 micron) should be mounted between the supply outlet and the internal filter of the machine.

Clean the water inlet filter (7) once a month or in case of poor throughput (inlet pressure below 1 bar at the flow rate required by the machine).



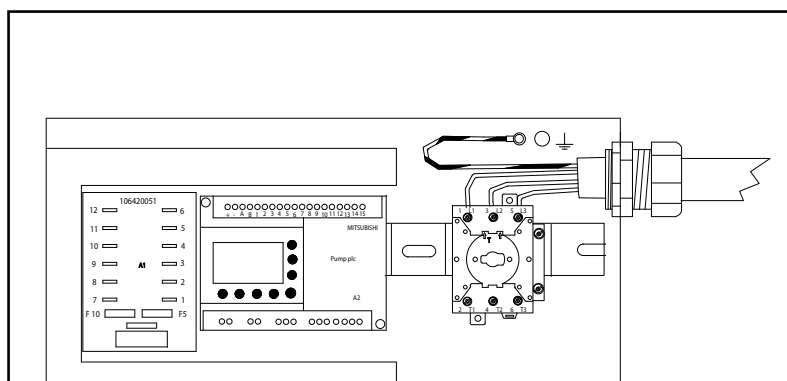
3.7 Mains power connection



CAUTION! An authorized electrician must perform the electrical connection of the machine to the main power supply. Refer to section "1 Safety precautions and warnings".

The following precautions must be observed:

- Make sure that the supply cable is of the correct dimension (see voltage and load on the data plate of the machine) and is suitable for the specific environment.



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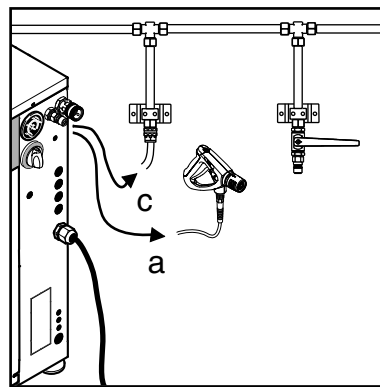
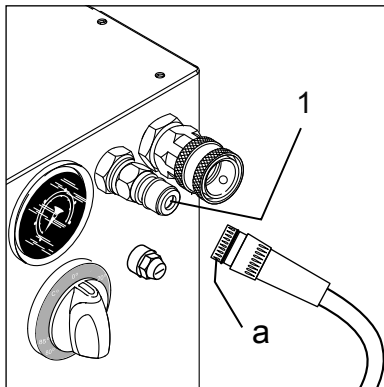
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- Guide the supply cable through the strain relief grommet on the frame (9) and through the strain relief grommet on the electric box into the electric box.
- Connect the phase cords of the supply cable to the connection terminals L1(1), L2(3) and L3(5) of the main switch of the machine. For single phase machines use L1(1) and L2(3) to connect phase and zero cords.
- Connect protective earth wire to the terminal marked  and located above the main switch on the metal chassis (6). Ensure the connection by the use of toothed washers.
- Check and measure the protective earth connection according to legislation.
- Connect the other end of the cable to an approved socket of a correct dimensioned main supply.

Make sure that the cable is properly guided and relieved between the fixed installation and the machine and that the cable is without any damage to the insulation.

Also see notes in section "**1 Safety precautions and warnings**"!

3.8 High pressure connection



The outlet of the machine (1) can be connected directly to a standard high pressure hose (a) or to a pipeline with fixed outlet points (c).

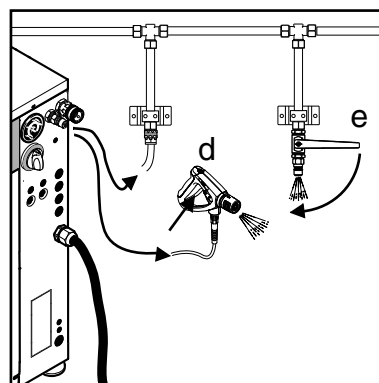
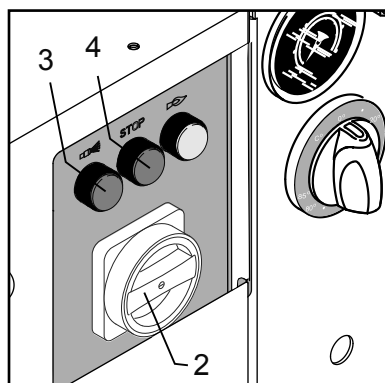
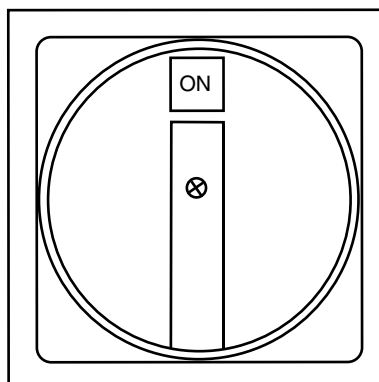
IMPORTANT: When connecting to a pipeline always use a flexible hose connection from the outlet of the machine (pos. 1).

Contact your Nilfisk distributor for further information about hose dimension.

It is recommended to let a service technician authorized by Nilfisk prepare the pipeline.

3.9 Venting (D models)

When the machine is properly connected to supply water, electrical installation and a high pressure hose (or pipeline) the high pressure pump must be vented before it is operational.



1. Turn the main switch, (2) to position "ON".
2. Push the "START" button (3), and the machine will start.
3. Open the outlet point (spray handle on high pressure hose, (d) or outlet on piping system (e) without having a spray lance connected.
4. Let the water run until all air has escaped from the pump (even water flow).
5. In the case of a recently installed piping system, or if the pipeline and the pump have been emptied in any other way, the system should be vented by starting the pump and then letting the water run at each outlet point of the pipeline at turns. It is recommended to begin with the most distant outlet (height and/or length).
6. When connecting the high pressure hose directly to the machine, starting the pump and activating the trigger of the spray handle without having attached the spray lance, you should vent the system.
7. Stop the machine by pressing the "STOP" push button (4).

The machine is now vented.

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3.10 Venting - E models

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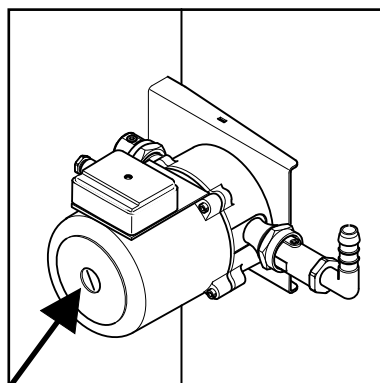
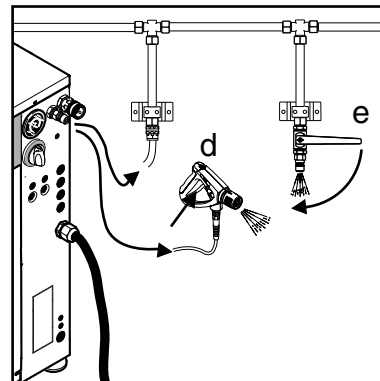
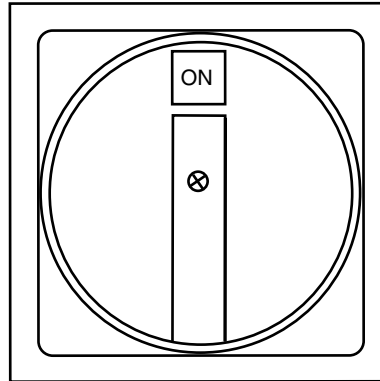
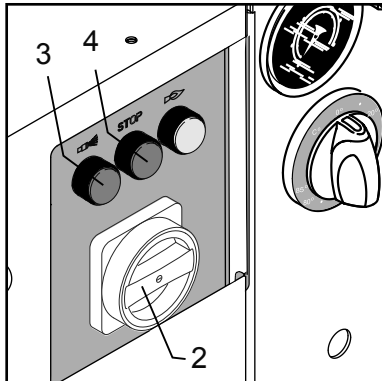
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When the machine is properly connected to supply water, electrical installation and a high pressure hose (or pipeline) the high pressure pump must be vented before it is operational.

1. Turn on the water inlet and wait until the water tank has been filled with water.
2. Turn the main switch (2), to position "ON".
3. Otherwise push the "START" button (3), and the machine will start.



button (3), and the machine will start.

4. Open the outlet point - spray handle on high pressure hose, (d) or outlet on piping system (e) without having a spray lance connected.
5. Let the water run until all air has escaped from the pump (even water flow). If little or no water flows from the system, it may be necessary to vent the internal feed pump separately. The Nilfisk service technician should perform this by loosening the centre screw on the feed pump, see arrow.
6. In the case of a recently installed piping system, or if the pipeline and the pump have been emptied in any other way, the system should be vented by starting the pump and then letting the water run at each outlet point of the pipeline at turns. It is recommended to begin with most distant outlet (height and/or length).
7. When connecting the high pressure hose directly to the machine, starting the pump and activating the trigger of the spray handle without having attached the spray lance should vent the system.
8. Stop the machine by pressing the "STOP" push button (4).

The machine is now vented.

3.11 Connecting to external fuel supply – D-models

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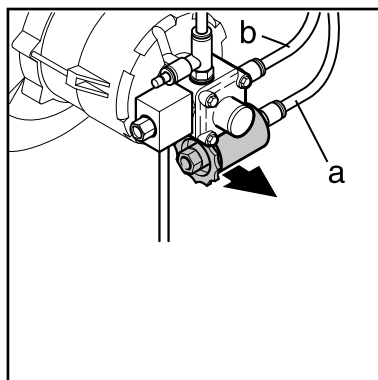
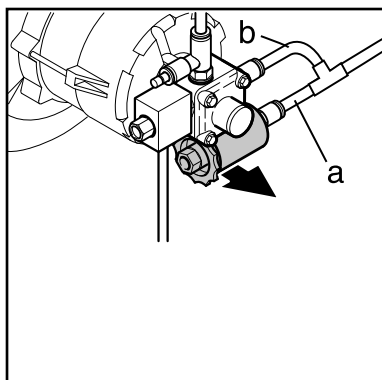
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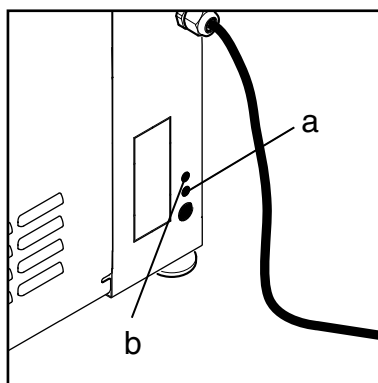
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All D- models must be connected to an external fuel supply (canister or tank) as no internal provision is made for storing fuel.

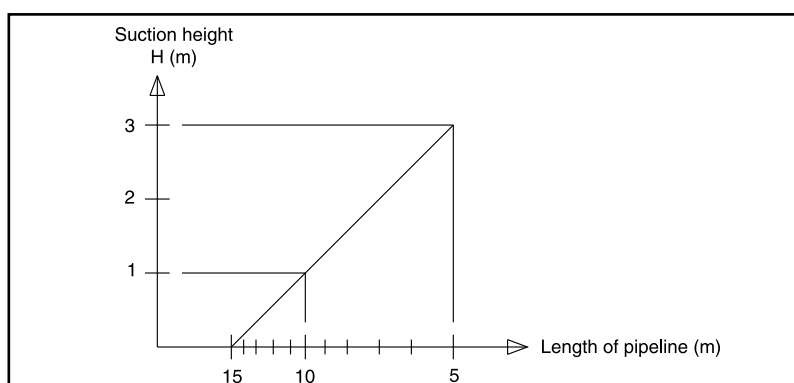
You can choose between one- and two-string connection, where "one"-string only has one supply hose (a) and "two"-string has an additional return hose (b) - see illustration.



Please observe that in some countries only the "one" string system is approved.

The fuel hose(s) should be guided through the rubber grommet(s) in the chassis of the machine as shown in the figure and routed securely to the external fuel supply.

a = Oil in
b = Oil return (only two-string connection)



Please observe the following restrictions to fuel line.

Diesel according to EN 590 (up to 7% bio diesel) can be used with the following restrictions:

- Maximum storage time in high pressure cleaner diesel tank: 1 month.
- Diesel stored externally for more than 6 months is not allowed to be filled into Nilfisk high pressure washers.
- Diesel EN 590 is not recommended for use in HPW's at an ambient temperature below 0°C.
- Diesel EN 590 from an open container must not be used.

EN 4 Operation

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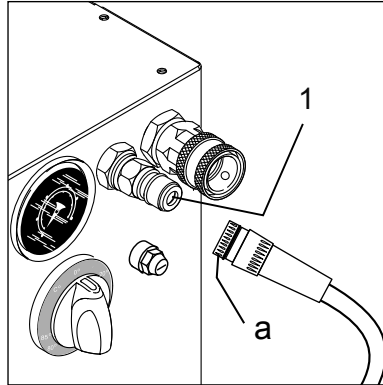
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4.1 Connections

4.1.1 High pressure hose - directly on the machine



The Nilfisk high pressure hose with imprinted max. working pressure and temperature should be attached to the outlet connection of the machine (1) by the quick coupling (a).

Max. extension hose: 50 m.

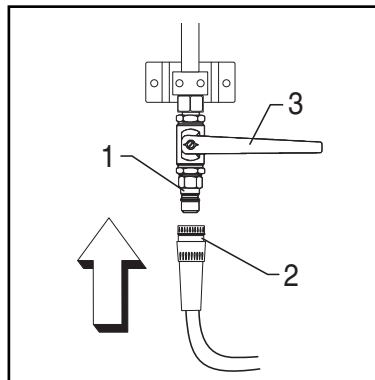
Danger of scalding!

Never dismount high pressure hoses at water temperatures above 50°C.

IMPORTANT: Prior to dismounting of the high pressure hose, the machine should be cooled down. After cooling down, stop the machine and close the shut-off cock. Then activate the trigger of the spray handle to relieve the high pressure hose of pressure.



4.1.2 High pressure hose - to outlet point



In the case of a pipeline with fixed outlet points the high pressure hose with imprinted working pressure and temperature should be attached to the nipple of the high pressure cock (1) by the quick coupling (2). Upon attachment turn the handle of the high pressure cock (3) to open position.

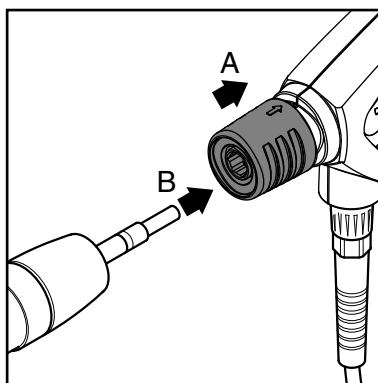
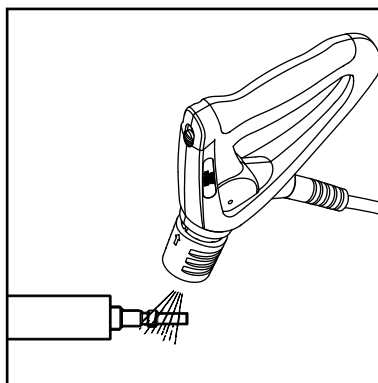
Danger of scalding!

Never dismount high pressure hoses at water temperatures above 50°C.

IMPORTANT: Prior to dismounting of the high pressure hose or when changing to another outlet point, the machine should be cooled down. After cooling down, stop the machine and close the high pressure cock carefully. Then activate the trigger of the spray handle to relieve the high pressure hose of pressure.



4.1.3 Spray handle - accessories



NOTE!

Clean nipple of any impurities each time the spray lance has been dismantled, see illustration.

1. Pull backward the quick coupling trigger (A) of the spray handle.
2. Insert the nipple of the spray lance (B) in the quick coupling and release the quick coupling again.
3. Pull forward the spray lance or any other accessory to ensure correct mounting before starting the machine.

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4.1.4 Selection of spray lance

You may use a double spray lance as well as a single spray lance with the machine. The recommended nozzle size of the lance is printed on the data plate of the machine – i.e. 0530. The working pressure of the machine can be reduced by using nozzles with a wider diameter.

Never use lances with smaller nozzles (nominal value / diameter) than stated on the data plate.

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4.1.5 Application of detergents (external)

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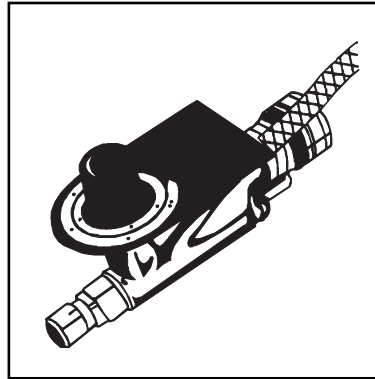
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If you want to apply detergents or disinfectants, these can be dosed to the water through an external injector. In conjunction with the injector it may be advantageous to use a wall rack on which spray lances, 2 pcs. of 25 l containers as well as 10 m high pressure hose can be placed.

Refer to your Nilfisk sales representative for your optimal solution.

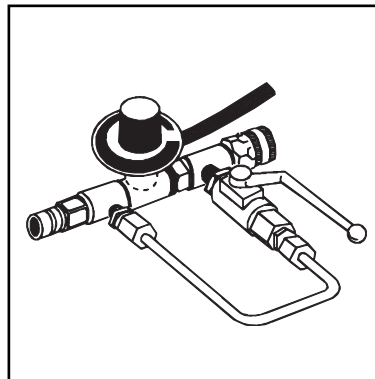
Below you will find various types of outlet points with injectors.



Outlet point with detachable injector

To be attached to the quick coupling of the high pressure cock. To be used for dosing of low-foaming detergents or disinfectants.

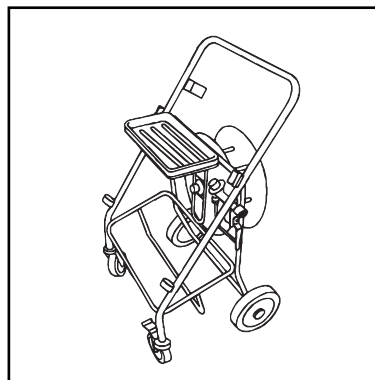
Dosage 1-8%.



Outlet point with detachable foam injector

To be attached to the quick coupling of the high pressure cock. To be used in conjunction with foam lance for application of high-foaming detergents or disinfectants.

Dosage 1-5%.



Outlet point with cleaning trolley and foam injector

To be attached to the quick coupling of the high pressure cock.

To be used in the same way as "Outlet point with detachable foam injector".

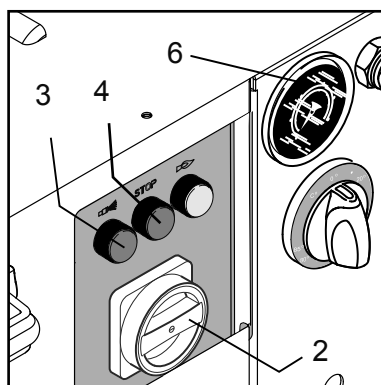
Makes it possible to place 4 spray lances, 2 pcs. of 25 l containers as well as 20 m high pressure hose.

4.1.6 Application of detergents (internal)

If your machine is equipped with an **optional**, internally mounted chemical system – dosing the chemical to the inlet of the high pressure pump, please refer to the separate “Operating instructions, Chemical dosing” on this option.

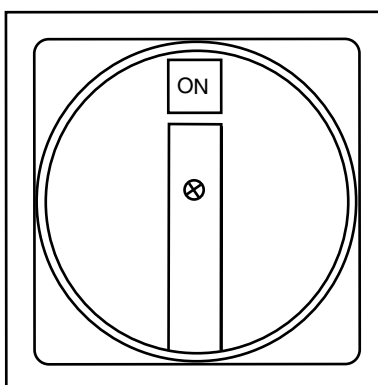
4.2 Operation

4.2.1 Starting up



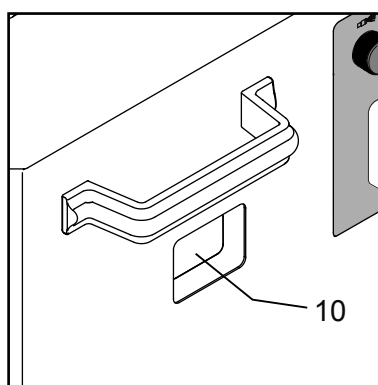
The shut-off cock on the water inlet should be open, and the spray handle on the high pressure hose should be closed.

1. Turn the main switch (2) to position - **ON** -.
2. Push the green "**START**" push button (3).



Check on the pressure gauge (6) that a pressure is being built up in the system and that the motor of the machine stops within appr. 20 seconds with the green “START” push button (3) lit. The machine is now in “Stand-by” mode waiting for the operator to activate the spray handle.

If a pressure is not being built up, vent the machine as described in sections **3.7 - 3.8 Venting**.



If the motor of the Does not start or stops unintendedly with the red “STOP” push button (4) flashing, an error is present. Read the error message through the "Inspection window" and refer to section "**7 Troubleshooting**".

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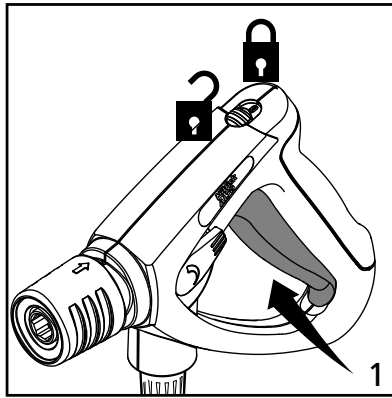
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4.2.2 Automatic start/stop



Always hold the spray lance with both hands!

The machine will automatically start when the trigger (1) of the spray handle is activated and will automatically stop and enter standby mode when the trigger is released. If the handle has not been activated within 20 seconds, the machine will enter stand-by mode.

When the machine is not in use, the trigger should be locked with locking device.

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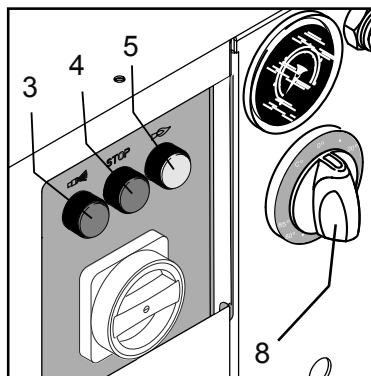
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4.2.3 Running with hot water

The machine is equipped with a heating source (electrical, or diesel driven) to heat the water.

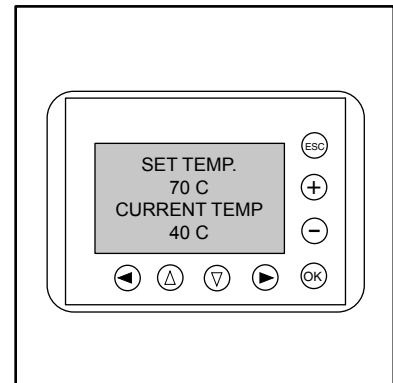
The heating source can be switched on or off at convenience by pushing the yellow "Heating" push button (5). Pushing the button once will turn on the lamp in the button and switch ON the heating source.

Pushing the button again will turn out the lamp in the button and switch OFF the heating source.



On the D-model the temperature can be adjusted within the limits stated on the "Thermostat" (8), by turning the knob to the desired value. When the heating source is ON (push button (5) alight), the preset and the actual outlet temperature of the water can be read on the display. The control unit of the

machine will monitor the water temperature and regulate the



heating source to provide the preset temperature.

On E-models, with heating tanks on the suction side of the high pressure pump, heating will be performed independently of the spraying operation - "Working mode" as well as "Standby mode". The temperature is controlled by a temperature sensor in the water tank. Thus the water will always be preheated to the desired value - ready for use when the spray handle is activated.

On D-models heating is performed by a burner in a pressurized boiler. Heating is controlled by a thermostat on the outlet of the boiler when water is flowing out of the machine - "Working mode". As the



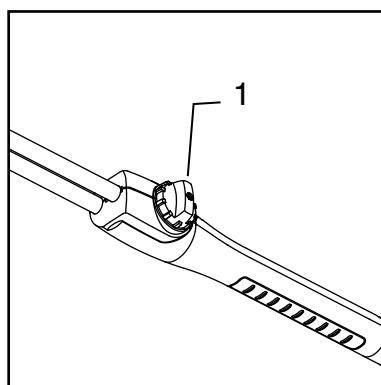
hot water does not have to pass through the high pressure pump the maximum temperature can be as high as 99°C.

If an error occurs to the heating system of the machine, the machine stops and the red "STOP" push button (4) will start flashing and the heating source will be shut off. Press the red button to re-set the machine.

By pushing the green "START" push button (3), the machine will continue to be functional with non heated water.

In this case please refer to section "**7 Troubleshooting**".

4.2.4 Double spray lance, pressure regulation



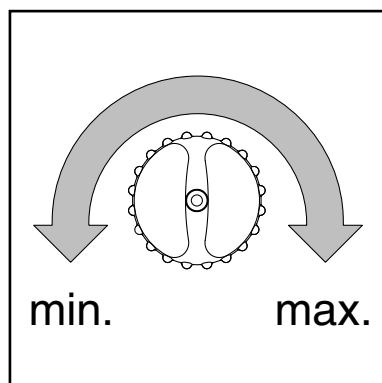
The spray lance features 2 nozzles, a high pressure nozzle and a low pressure nozzle.

High pressure mode

When the pressure reducing valve (1) is completely closed (turned clockwise - **B**), only the high pressure nozzle is used - **high pressure mode**.

Low pressure mode

When the reducing valve (1) is completely opened (turned counterclockwise - **A**), both spray lances are used - **low pressure mode** / possibility of dosing detergents.



The pressure may be regulated between these positions.

4.2.5 Stop



Danger of scalding!

Never detach high pressure hoses at a water temperature above 50°C.

Prior to dismantling of the high pressure hose, the machine should be cooled down. After cooling down, stop the machine and close the shut-off cock.

Never detach the high pressure hose while the machine is in operation.

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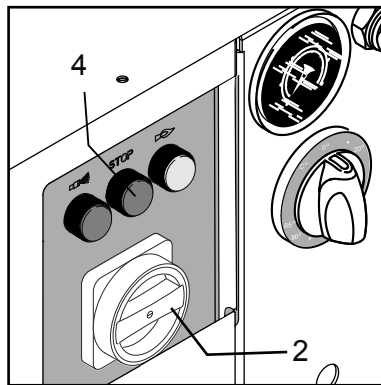
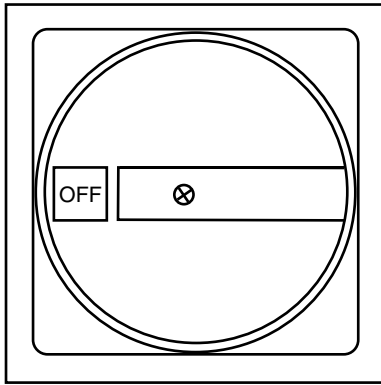
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1. To stop the machine push the red "STOP" button (4). The red light will come on. To disconnect the machine completely from mains, turn the main switch (2) to position - **OFF** -.
2. Close the shut-off cock of the water inlet and activate the spray lance or open the high pressure cock to relieve the pipeline / high pressure hose of pressure.

4.2.6 Automatic "system shut-down"

Your machine features a function called "system shut-down".

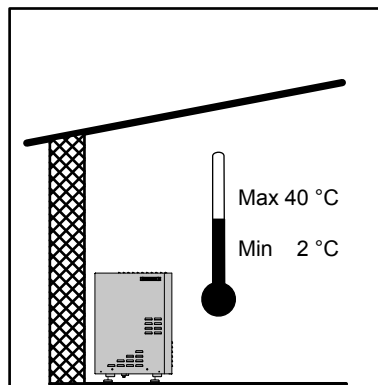
If this function is activated the machine will automatically shut down if it has not been used in a period preset by the user (1 sec. - 9 hours).

On the E-model it will be possible to automatically stop the heating of the water in the water tank if the machine has not been used in a period preset by

the user (1 sec. - 9 hours).

The functions system shut-down and switching off the heating work together but may have different switch-off delays. The functions are disabled on delivery - please contact your Nilfisk service representative if you would like the function(s) to be enabled.

4.2.7 Frost protection



The machine should be installed in a frost-free room. This applies to pump as well as pipelines incl. of outlet points. Concerning outdoor outlet points it should be possible to empty that part of the line which is exposed to frost.

IMPORTANT: For safety reasons, hoses, spray lances and other accessories should always be thawed prior to use.

5 Fields of Application and Working Methods

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5.1 Fields of application

The most important fields of application for this product are:

| | |
|------------------------------------|--|
| Agriculture | Cleaning of machinery, agricultural implements, stalls, equipment and buildings. |
| Transport | Cleaning of trucks, buses, cars etc. |
| Building & Construction | Cleaning of vehicles, equipment, buildings etc. |
| Light industry | Degreasing and cleaning of machines, workpieces, and vehicles. |
| Service | Cleaning of vehicles, public baths, institutions etc. |

5.2 Working pressure

The high pressure system may be used with high or low pressure at your own option:

| | |
|------------------------------|--|
| Low pressure | Is first and foremost used for the application of detergents and for flushing. |
| High pressure | Is used during the actual cleaning. |
| Intermediate pressure | As an example it may be used for the cleaning of surfaces which cannot stand a too powerful jet, i.e. soft surfaces. |

5.3 Temperature

Hot water significantly increases the efficiency of the cleaning process – especially grease, oils and fats can be broken down more easily at higher temperatures.

Temperatures up to 60°C should clean off proteins, such as blood substances.

Oil and traffic film should be exposed to app. 70°C, whereas grease and fat is easiest to remove with temperatures of 80 to 85°C.

Several detergents become more efficient when acting with hot water – please refer to manufacturers recommendations.

5.4 Mechanical impact

In order to break down tough layers of dirt, additional mechanical impact may be required. Special lances with special nozzles (pulsating jet /

concentrated "0" jet) are available for such purposes as are rotating brushes plus soft & sand blasting equipment.

Please ask your Nilfisk representative.



5.5 Detergents



As standard the system is delivered without a detergent injector and the optional, factory mounted, internal chemical system.

If you want to use detergents or disinfectants these should be dosed through an external injector (see section 4.1.5) or through the pump (see section 4.1.6).

The most efficient cleaning is reached with detergents in conjunction with the high pressure cleaning. For that purpose Nilfisk can offer you a series of products specially developed for high pressure cleaning, among other fields within:

- Cleaning of vehicles, machines, stalls etc.
- Disinfection
- Degreasing of workpieces
- Descaling

The products are water-based, without phosphates, and the applied tensides (surface active substances) comply with the present requirements for easy biodegradability.

General rules for addition of detergents

Nilfisk cleaning equipment can be used for all detergents and disinfectants, which are suitable for high pressure cleaning according to the prescriptions of the supplier. (If using external injector, section 4.1.5, the pH-value should be between 4 and 14. If using addition of chemicals through the high-pressure pump, section 4.1.6, the pH-value MUST be between 5.5 and 8.5). Acid and lye should not be applied in a concentrated form.

Carefully observe the prescriptions and guidelines of the supplier, also the rules concerning safety clothing and drainage facilities.

Contact your Nilfisk distributor for directions as to which product(s) will fulfil your requirements.

The method of application and the dosage of the individual products appear from the product labels or the data sheet.

Low-foaming detergents are applied through an injector and under low pressure. A change to cleaning under high pressure is effected by regulating from »low pressure mode« to »high pressure mode« on the double spray lance or by attaching a high pressure spray lance.

For foam cleaning you will have to attach a special foam equipment. Insert the suction hose of the injector into the foam detergent.

Attach the foam lance on the spray handle and now you are ready for foam application. Upon the application open the by-pass cock of the foam injector and replace the foam lance by a spray lance, and you are ready for cleaning.

Detergents, which are not exactly prescribed for use in conjunction with high pressure cleaning, **must only** be used upon a previous approbation from Nilfisk and the supplier.

The use of Nilfisk detergents ensures that machines, accessories and detergents match, which is the condition of an optimal solution of a cleaning task.

Nilfisk can offer you a wide range of efficient agents for cleaning and disinfection. The products are composed of substances which combine efficiency and environmental considerations at one and the same time.

5.6 Working methods

Your high pressure hot water washer has been developed for cleaning according to the so-called »2-step method«.

However, your high pressure hot water washer must be equipped with an external detergent injector.

STEP 1

Application of detergent -soaking.

STEP 2

High pressure cleaning.

In practice the working process is laid down in accordance with the actual job, but as a starting point the following working method can be described for a job:

1. Apply detergent under low pressure. The dosage is chosen according to the job which is to be carried through, and the adjustment is made on the dosing unit.
2. Await acting time. Let the detergent act on the dirt/surface for a short time prior to pressure cleaning - usually a few minutes.
3. High pressure cleaning. Clean all surfaces under high pressure.
4. Rinse afterwards, if necessary. To make sure that residual impurities are removed from the surface.

In connection with the working process the optimum cleaning will be reached by following these 3 pieces of advice:

Advice no. 1

When using a detergent, usually always apply it on a dry surface. If the surface is rinsed with water at first, it may be difficult for it to absorb the detergent, and the result is a reduced effect of the detergent.

Advice no. 2

When applying a detergent on large vertical surfaces (i.e. the sides of a truck) work from below and upwards. Thus you will avoid the detergent running off the surface through grooves and dark streaks appearing on the surface whilst cleaning.

Advice no. 3

During the high pressure cleaning you should work so that the high pressure water does not run over the surface which has not been cleaned yet. This is to ensure that there is sufficient detergent on the surface when the high pressure water hits the surface.



**5.7 Typical cleaning tasks****5.7.1 Agriculture**

| Task | Accessories | Method |
|---|---|--|
| Stables Pig pens, sties Cleaning of walls, floors and equip- ment Disinfectant | Chemical foam injectors Foam lance Powerspeed lance Floor cleaner Detergents Universal Alkafoam Disinfectant DES 3000 | <ol style="list-style-type: none"> 1. Soaking - apply foam to all surfaces (bottom to top) and wait for approx. 30 minutes. 2. Remove the dirt from surface with the high pressure lance or chosen accessory. Again, clean from bottom to top on vertical surfaces. 3. To flush away large quantities of dirt, change to low pressure mode and use the higher flow to push away the dirt. 4. Use recommended disinfectant products and methods to ensure hygiene. Apply DES 3000 disinfectant once the surfaces are perfectly clean. |
| Machinery Tractors Ploughs etc. | Detergent injection Powerspeed lances Curved lances and un- derchassis washers Brushes | <ol style="list-style-type: none"> 1. Apply detergent to vehicle or equipment surfaces in order to soften up dirt and grime. Apply from bottom to top. 2. Proceed with cleaning using the high pressure lance. Clean again from bottom to top. Use accessories to clean in difficult to reach places. 3. Clean fragile areas such as motors, rubber at lower pressure levels to avoid damage. |

5.7.2 Vehicle

| Task | Accessories | Method |
|-------------------------------|--|--|
| Vehicle body- work | Standard lance Detergent injection Curved lances and un- derchassis washers Brushes Detergents Active Shampoo Active Foam Sapphire Super Plus Aktive Wax Allosil RimTop | <ol style="list-style-type: none"> 1. Apply detergent to vehicle or equipment surfaces in order to soften up dirt and grime. Apply from bottom to top. In cases of particularly dirty vehicles, pre-spray with a product such as Allosil in order to remove traces of insects etc, then rinse at low pressure and apply normal car cleaning detergent. Let detergents settle for 5 minutes before cleaning off. Metallic surfaces can be cleaned using RimTop. 2. Proceed with cleaning using the high pressure lance. Clean again from bottom to top. Use accessories to clean in difficult to reach places. Use brushes in order to add a mechanical cleaning effect. Short lances can help for cleaning of motors and wheel arches. Curved lances or undercarriage washers can be valuable for the cleaning of car under-chassis and wheel arches. 3. Clean fragile areas such as motors, rubber at lower pressure levels to avoid damage. 4. Apply a liquid wax using the pressure washer in order to protect the bodywork from pollution. |



5.7.3 Building and equipment

| Task | Accessories | Method |
|--|---|--|
| General surfaces Metallic equipment | Foam injectors Standard lance Curved lances Tank cleaning head Detergents Intensive J25 Multi Combi Aktive Alkafoam Disinfectant DES 3000 | <ol style="list-style-type: none"> 1. Apply thick foam over the surfaces to be cleaned. Apply on dry surfaces. Apply from top to bottom on vertical surfaces. Let the foam act for up to 30 minutes for the optimal effect. 2. Proceed with cleaning using the high pressure lance. Use applicable accessories. Use high pressure to dislodge large amounts of incrustated dirt or grime. Use lower pressure and high water volume in order to rapidly flush away loose dirt and rinse surfaces. 3. Apply DES 3000 disinfectant once the surfaces are perfectly clean. <p>Areas covered by amounts of loose dirt, such as animal remains in slaughterhouses, can be removed by using high water flow to flush away the dirt to evacuation pits or drains.</p> <p>Tank cleaning heads can be used to clean barrels, vats, mixing tanks etc. Cleaning heads may be hydraulically or electrically powered and give the possibility for automatic cleaning without a constant user.</p> |
| Rusted or damaged surfaces prior to treatment | Wet sand blasting equipment | <ol style="list-style-type: none"> 1. Connect the sand blasting lance to the pressure washer and place the suction tube in the sand. 2. Always wear protective equipment during sand blasting. 3. Spray the surfaces to be treated with the mix of water and sand. Rust, paint etc will be stripped off. |

These are merely several examples of cleaning tasks that can be solved by a pressure washer in association with accessories and detergents. Each cleaning task is different. Please consult your local dealer or Nilfisk representative in order to discuss the best solution for your own cleaning tasks.

6 Maintenance

To ensure the most optimal maintenance of your machine, you should consider making a "Service Contract" with Nilfisk. In this way your machine will always be ahead of potential problems.

Though paying attention to a few things will ensure a prolonged and reliable operation of your machine. Therefore it will be a good idea to make a habit of the following:

Prior to attaching the water hose and the high pressure hose, the quick couplings should be cleaned of dust and sand. Flush if necessary. This will prevent premature clogging of filters.

Prior to attaching the spray lance or other accessories to the spray handle, the machine should be started and the quick coupling cleaned of dust and sand.

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Maintenance Schedule

| | Weekly | After the first 50 operating hours | Every six months or 500 operating hours | As required |
|-----------------------------|--------|------------------------------------|---|-------------|
| 6.2 Checking pump oil level | ● | | | |
| - Changing pump oil | | ● | ● | |
| 6.3 Cleaning water filter | ● | | | ● |
| 6.5 Fuel filter | | ● | | ● |

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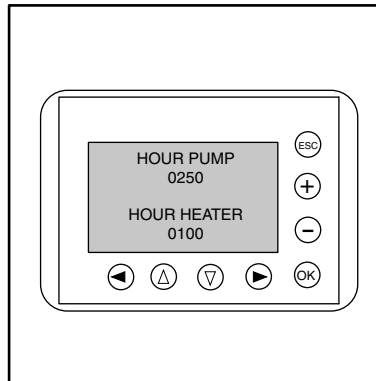
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6.1 Hour counters

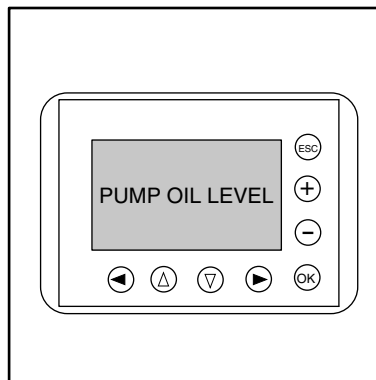


Your machine features built-in hour counters that keep track of the number of working hours on your machine.

By depressing the red "STOP" button (4) and keeping it depressed, you will be able to see the number of working hours on the pump and the heating system through the inspection window (10).

Letting go of the "STOP" button will switch off the hour counter display again.

6.2 Oil



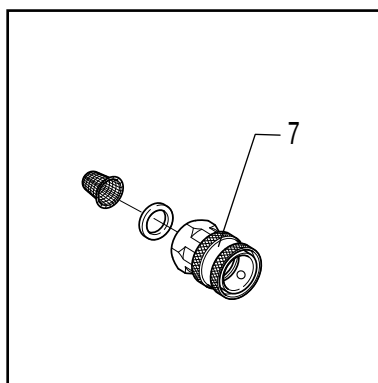
Your machine is equipped with an electronic "oil sensor", which monitors the level of lubricant oil in the high pressure pump. If the oil level (by malfunction or excessive wear) should drop to a low level, your machine will stop (or not be able to start) with an error indication "PUMP OIL LEVEL" in the inspection window.

Topping up the oil cup will be possible with the cabinet removed, but you should send for a Nilfisk service technician as soon as possible to disclose the cause of the oil loss.

PROTECT THE ENVIRONMENT

Waste oil and oil sludge must be removed as laid down in the instructions.

6.3 Water filter



To avoid debris entering the high pressure pump, a water filter (fine) is fitted at the water inlet. Dependent on the purity of the water, this filter will have to be cleaned at regular intervals. The filter can be removed when the quick coupling (7) has been unscrewed.

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6.4 Cleaning of high pressure nozzle

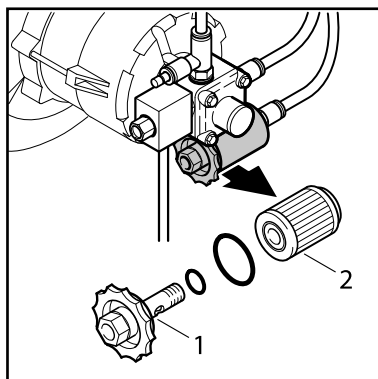
A clogging up in the nozzle will cause the pump pressure to increase above normal operating pressure, and cleaning of the nozzle is required immediately.

1. Stop the cleaner and detach the spray lance.
2. Clean the nozzle with the cleaning tool.

IMPORTANT: ONLY use the cleaning tool when the spray lance is detached.

3. Flush the spray lance backwards with water.
4. If the pressure is still too high, repeat items 1-3.

6.5 Fuel filter - D-models only



Remove the cabinet to gain access to the fuel pump.

1. Clean filter:
Unscrew filter cap (1).
2. Clean/replace fuel filter (2).
3. Dispose of cleaning solution/damaged filter in accordance with the disposal regulations.

6.6 Disposable waste

This high pressure hot water washer consists of parts which can affect the environment when thrown away. Parts that can pollute are as follows:

Oil, painted/zinc-coated parts, plastics/plastic-coated parts. Therefore, it is important to follow the laws concerning the removal of polluting and dangerous materials when replacing spare parts or disposing of high pressure hot water washer.

It is recommended that you bring the rejected parts to waste disposal areas or recycling plants that are approved for the destruction of these types of materials.

EN 7 Trouble Shooting

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You have chosen the best quality and therefore deserve the best service. All machines feature an "Error detection system" that will stop the machine in case of a severe error that needs immediate attention. The red light of the STOP button will flash, and the display in the inspection window will indicate the nature of the error. Please refer to the specific section (7.2 to 7.3) that represents your machine.

Though the user can correct some of these errors, you should note the error and contact the nearest Nilfisk service organisation. To avoid unnecessary disappointments, you should check section "7.1 General trouble shooting" before contacting the nearest Nilfisk service organisation.

Should other malfunctions occur than those mentioned in sections 7.1 to 7.3, please contact your nearest Nilfisk service organisation.

7.1 General trouble shooting - all models

| Symptom | Reason | Action |
|--|---|--|
| Machine will not start (NO ERROR indication) | <ul style="list-style-type: none"> > A fuse has blown > Power disconnected | <ul style="list-style-type: none"> • Change the fuse. • Connect power. |
| Fuses blow | <ul style="list-style-type: none"> > Installation does not correspond to the ampere consumption of the machine | <ul style="list-style-type: none"> • Change to an installation corresponding to the ampere consumption of the machine at a minimum. Change the fuse. |
| Working pressure too low | <ul style="list-style-type: none"> > Nozzle worn > Wrong spray lance > Reduction valve of spray lance not adjusted to max. pressure. > Nozzle partly clogged up | <ul style="list-style-type: none"> • Replace the nozzle. • Replace the spray lance (see section 4.1.4). • Turn reduction valve completely counter-clockwise (see section 4.1.4). • Clean the nozzle (see section 6.4). |
| Working pressure fluctuating | <ul style="list-style-type: none"> > Insufficient water supply > High pressure hoses too long | <ul style="list-style-type: none"> • Dismount the cabinet and check that the water tank is not drained of water during operation of the machine. If it is, clean the water inlet filter of the machine. If that does not solve the problem, the water supply for the machine is insufficient. NB! Avoid long, thin hoses (min. 3/4"). • Dismount high pressure extension hoses and retry. Extension hose max. 50 m. NB! Avoid long extension |

| Symptom | Reason | Action |
|---------------------------------|---|--|
| | | hoses with many couplings. |
| | > Air in the system | • Vent the system (see section 3.7). |
| | > Detergent container empty | • Refill or close dosing valve. |
| | > Water inlet filter clogged up | • Clean filter (see sect. 6.3). |
| No working pressure | > Nozzle clogged up | • Clean nozzle (see sect. 6.4). |
| | > No inlet water | • Check that the shut off cock of the water inlet is open. Check that the water supply meets the requirements (see section 1.2). |
| | > High pressure cock of outlet point open | • Close all high pressure cocks not in use. |
| Machine starts and stops | > Leaky hose/ pipeline/spray handle | • Repair leak. |

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7.2 Errors messages, E (electrical heated) models

If heating cannot be switched on or is switched off without any error messages, it is likely that the overheat protection (pos. 11 on fold out page) has tripped. Unscrew the dust cap, and push the rod to reset the overheat protection switch. If this error re-occurs, call Nilfisk service.

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| Error Message (red STOP light flashing) | Reason | Action |
|--|--|--|
| Pump oil level low E3 | > Level of lubricant oil of HP pump is at a low level | <ul style="list-style-type: none"> Remove cabinet and top up oil if no leakage is present. Call Nilfisk service if oil is leaking or if water is mixed in the oil (creamy white or transparent) |
| Water shortage E1 | > Lack of water in heating tank | <ul style="list-style-type: none"> See section "3.8 Venting" Check your water supply – open?, sufficient pressure? Check and clean inlet filter, section 6.3. |
| Motor cut out E10 | > Motor is not running > Missing phase in your instal. > Overload or short circuit of the machine. | <ul style="list-style-type: none"> Motor overheated – let the machine cool down and retry. Check pressure and check nozzle size and clean nozzle if necessary. Cooling of motor disturbed – call Nilfisk service. Call authorized electrician. Call Nilfisk service. Other motor problems – call Nilfisk service. |

7.3 Error messages, D (diesel heated) models

If your Diesel model does not heat the water although the yellow “Heating” push button (5) has been activated, the “overheat melting fuse” has blown. This fuse is located within the machine and **MUST ONLY** be exchanged by a Nilfisk service technician.

| Error Message (red STOP light flashing) | Reason | Action |
|--|--|---|
| Pump oil level low E3 | > Level of lubricant oil of HP pump is at a low level | <ul style="list-style-type: none"> • Remove cabinet and top up oil if no leakage is present. • Call Nilfisk service if oil is leaking or if water is mixed in the oil (creamy white or transparent) |
| Overload cut out E2 | > Overload or short circuit of the machine. > If Option “Low water security” mounted – lack of inlet pressure can be the reason | <ul style="list-style-type: none"> • Call Nilfisk service. • Check your water supply – open?, sufficient pressure? |
| Water Shortage E1 | > Lack of water or > Defective or mal-adjusted flow sensor / pressure switch | <ul style="list-style-type: none"> • Check your water supply – open?, sufficient pressure? • Check and clean inlet filter, section 6.3. • Call Nilfisk service. |
| Flow failure E4 | > Defective or mal-adjusted flow sensor | <ul style="list-style-type: none"> • Call Nilfisk service. |
| No flame detected E5 | > No flame is detected when it should be present > Fuel filter clogged > Flame sensor soothed or defective | <ul style="list-style-type: none"> • Check your fuel supply, and refill is necessary. • Call Nilfisk service. • Call Nilfisk service. |
| Illegal flame detected E6 | > Flame detected when it should NOT be present > Flame sensor defective | <ul style="list-style-type: none"> • Flame sensor not mounted in place. Mount sensor. • Call Nilfisk service |

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8 Technical Data



| PROGRAM | SH SOLAR 7P-135/875 E18 | SH SOLAR 7P-170/1200 E18 | SH SOLAR 7P-170/1200 E18 | SH SOLAR 7P-170/1200 E18 | SH SOLAR 7P-170/1200 E36 | SH SOLAR 7P-170/1200 E54 | SH SOLAR 7P-170/1200 E54 |
|---|----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Item Nr. | 107370260 | 107370270 | 107370272 | 107370274 | 107370276 | 107370278 | 107370278 |
| Performance data : | | | | | | | |
| Pump pressure [bar] | 135 | 170 | 170 | 170 | 170 | 170 | 170 |
| Q _{tec} [l/h] | 810 | 1110 | 1110 | 1110 | 1110 | 1110 | 1110 |
| Cleaning Impact [kg-force] | 3.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 |
| Δ temp - (Full flow) [°C] | 19 | 14 | 14 | 14 | 28 | 42 | 42 |
| Heating power [kW] | 18 | 18 | 18 | 18 | 36 | 54 | 54 |
| Efficiency [%] | 99 | 99 | 99 | 99 | 99 | 99 | 99 |
| Weight (empty) [kg] | 150 | 155 | 155 | 155 | 156 | 157 | 157 |
| Max. sound power level [LWA] | 93 | 93 | 97 | 97 | 93 | 93 | 97 |
| Motor / Pump : | | | | | | | |
| Nozzle type | 530 | 680 | 680 | 680 | 680 | 680 | 680 |
| Q _{max} [l/h] | 875 | 1200 | 1200 | 1200 | 1200 | 1200 | 1200 |
| Pump type | C3 | C3 | C3 | C3 | C3 | C3 | C3 |
| Pump oil. type | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 |
| Motor output power [kW] | 5.6 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 |
| Motor / pump [rpm] | 1450 | 1450 | 1450 | 1450 | 1450 | 1450 | 1450 |
| Pump drive | Direct | Direct | Direct | Direct | Direct | Direct | Direct |
| Connection requirements : | | | | | | | |
| Voltage [V] | 400 | 400 | 440 | 440 | 400 | 440 | 440 |
| Current - Max. consumption [amp] | 35.9/~3 | 39.4/~3 | 39.4/~3 | 39.4/~3 | 65.3/~3 | 91.2/~3 | 91.2/~3 |
| Power consump. (heating+motor) [kW] | 18 + 5.8 | 18 + 7.5 | 18 + 7.5 | 18 + 7.5 | 36 + 7.5 | 54 + 7.5 | 54 + 7.5 |
| Frequency [Hz] | 50 | 50 | 60 | 60 | 50 | 60 | 60 |
| Min. inlet water pressure (full flow) [bar] | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| Heating : | | | | | | | |
| Boiler type | Water tank | Water tank | Water tank | Water tank | Water tank | Water tank | Water tank |
| Max. inlet temperature [°C] | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| Max. outlet temperature [°C] | 85 | 85 | 85 | 85 | 85 | 85 | 85 |
| Burner fuel type | Electricity | Electricity | Electricity | Electricity | Electricity | Electricity | Electricity |
| Fuel consumption @ΔT=40°C [kg/h] | - | - | - | - | - | - | - |
| Available options : | | | | | | | |
| Stainless steel cabinet | • | • | • | • | • | • | • |
| Manual detergent | • | • | • | • | • | • | • |
| Remote control | • | • | • | • | • | • | • |
| 1 x detergent | • | • | • | • | • | • | • |
| 2 x detergent | • | • | • | • | • | • | • |
| Mechanical coin box | • | • | • | • | • | • | • |
| Mechanical coin box with detergent | • | • | • | • | • | • | • |
| Low water security | • | • | • | • | • | • | • |
| No-Scale | • | • | • | • | • | • | • |
| Cold/warm selector switch | • | • | • | • | • | • | • |
| Pressure relief | • | • | • | • | • | • | • |
| Multiple machine connection box | • | • | • | • | • | • | • |



| PROGRAM | SH SOLAR 5M-165/1100 D | SH SOLAR 7P-170/1200 D | SH SOLAR 7P-170/1200 DSS | SH SOLAR 8P-180/2000 D |
|---|-----------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| Item Nr. | 1073710055 | 107370070 | 107370077 | 107370080 |
| Performance data : | | | | |
| Pump pressure [bar] | 165 | 170 | 170 | 180 |
| Q _{tec} [l/h] | 1000 | 1110 | 1110 | 1900 |
| Cleaning Impact [kg-force] | 5.2 | 5.8 | 5.8 | 10.3 |
| Δ temp - (Full flow) [°C] | 65 | 76 | 76 | 49 |
| Heating power [kW] | 80 | 115 | 115 | 115 |
| Efficiency [%] | 92 | 92 | 92 | 94 |
| Weight (empty) [kg] | 189 | 212 | 212 | 232 |
| Max. sound power level [LwA] | 92 | 93 | 93 | 93 |
| Motor / Pump : | | | | |
| Nozzle type | 600 | 680 | 680 | 1100 |
| Q _{max} [l/h] | 1100 | 1200 | 1200 | 2000 |
| Pump type | NA5 | C3 | C3 | AR |
| Pump oil. type | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | Castrol Alphasyn T 150 | SAE 15W 40 |
| Motor output power [kW] | 6.7 | 6.5 | 6.5 | 11.0 |
| Motor / pump [rpm] | 1450 | 1450 | 1450 | 1450 |
| Pump drive | Direct | Direct | Direct | Direct |
| Connection requirements : | | | | |
| Voltage [V] | 400 | 400 | 400 | 400 |
| Current - Max. consumption [amp] | 15/~3 | 15/~3 | 15/~3 | 24/~3 |
| Power consump. (heating+motor) [kW] | 1.4 + 6.9 | 1.4 + 7.5 | 1.4 + 7.5 | 1.4 + 12.7 |
| Frequency [Hz] | 50 | 50 | 50 | 50 |
| Min. inlet water pressure (full flow) [bar] | 1.0 | 1.0 | 1.0 | 1.0 |
| Heating : | | | | |
| Boiler type | EcoPower 5 | EcoPower 7 | EcoPower 7 | EcoPower 7 |
| Max. inlet temperature [°C] | 30 | 30 | 30 | 30 |
| Max. outlet temperature [°C] | 99 | 99 | 99 | 99 |
| Burner fuel type | Diesel | Diesel | Diesel | Diesel |
| Fuel consumption @ΔT=40°C [kg/h] | 4.8 | 4.9 | 4.9 | 4.9 |
| Available options : | | | | |
| Stainless steel cabinet | • | • | • | • |
| Manual detergent | • | • | • | • |
| Remote control | • | • | • | • |
| 1 x detergent | • | • | • | • |
| 2 x detergent | • | • | • | • |
| Mechanical coin box | • | • | • | • |
| Mechanical coin box with detergent | • | • | • | • |
| Low water security | • | • | • | • |
| No-Scale | • | • | • | • |
| Cold/warm selector switch | • | • | • | • |
| Pressure relief | • | • | • | • |
| Multiple machine connection box | • | • | • | • |

EN 9 Warranty

DE

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Your Nilfisk product is guaranteed for 12 months from date of purchase (purchase receipt must be presented) on the following conditions:

- that defects are attributable to flaws or defects in materials or workmanship. (Usual wear and tear as well as misuse is not covered by the guarantee).
- that repairs have not been carried out or attempted by other than Nilfisk-trained service staff.

- that only original accessories have been applied.
- that the product has not been exposed to abuse such as knocks, bumps or frost.
- that the instructions in the manual have been carefully observed.

A warranty repair comprises the replacement of defective parts, but it does not cover freight and packaging charges. Besides we refer to national Sale of Goods Act.

Any **illegitimate** guarantee repair will be invoiced. (I.e. malfunctions due to **causes** mentioned in section “**7.0 Trouble shooting**” of the instruction manual).

10 Declaration of Conformity

We,

Nilfisk A/S
Kornmarksvej 1
DK-2605 Broendby
DENMARK

Hereby solely declare, that the

Product: HPW - Professional - Stationary
Description: 400V 3~, IPX5, Indoor use
Type: SH SOLAR 5M */* D, SH SOLAR 7P */* D, DSS, E, SH SOLAR 8P */* D

Is in compliance with the following standards:

EN 60335-1:2012+A11:2014
EN 60335-2-79:2012
EN 60204-1:2006+A1:2009
EN 55014-1:2006+A1:2009+A2:2009
EN 55014-2:2015
EN 61000-3-2:2014
EN 61000-3-11:2000

Following the provisions of:

2006/42/EC
2014/30/EU

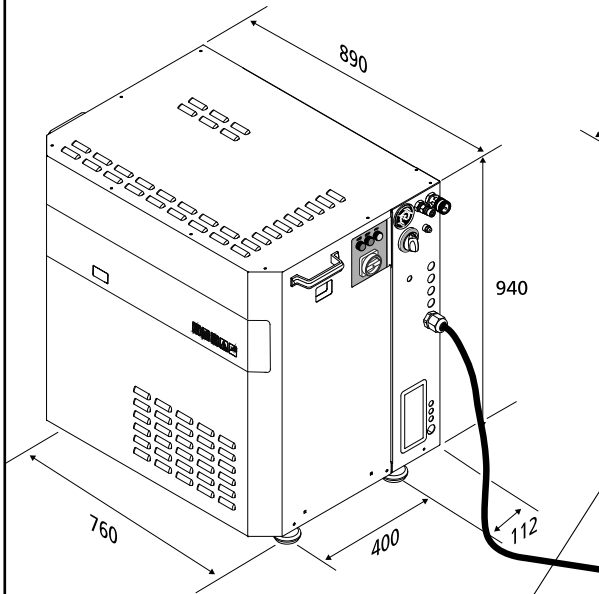
Hadsund, 24-10-2016



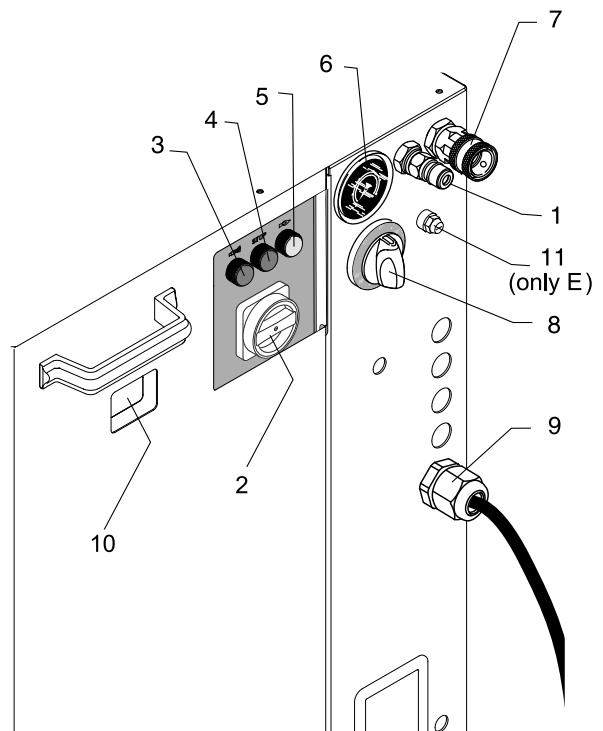
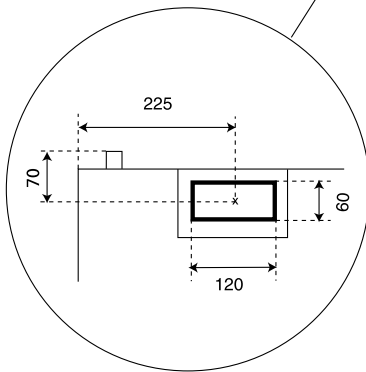
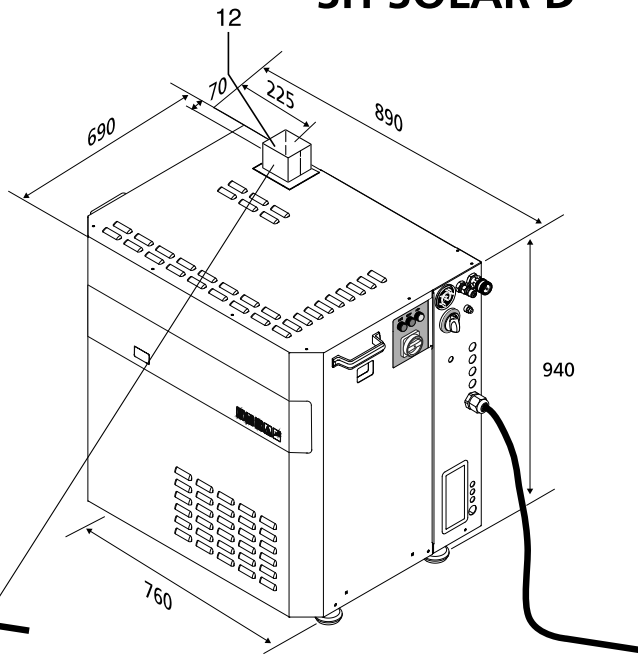
Anton Soerensen
Senior VP, Global R&D



SH SOLAR E



SH SOLAR D





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