

Operating instructions



SOLAR BOOSTER D, EH



107319182 c (05.2014)
EN-DE-FR-NL-ES-IT-RU-HU

شريف صنعت پارسا



Nilfisk
ALTO
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1 Safety Precautions and Warnings

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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.



This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge.

High pressure cleaners shall not be used by children or untrained personnel.

Children should be supervised to ensure that they do not play with the appliance.

Warning

Inhalation of aerosols can be hazardous to health.

Where applicable use a device in order to avoid or reduce aerosols production, e.g., a shield covering the nozzle.

For protection against aerosols use a respiratory mark of class FFP 2 or higher.

General

When using the high pressure hot water washer all existing national regulations must be observed. Beyond the instruction manual and the current national legal regulations for prevention of accidents, also

the approved rules for safe working must be observed.

Any method of use endangering the safety of persons or equipment is forbidden.

Before use

Before starting up your high pressure hot water washer check that it is in a regular condition. Electric plugs and couplings must be watertight.

Check the electric cables at regular intervals for damage and wear. Only use the high pressure hot water washer if the electric cable is all right (damaged electric cables can cause electric shock!)

Important instructions

Connection to public drinking water supply must be performed in accordance with the applicable regulations in your country.

IMPORTANT: Only use water without impurities!

Before each use of your high pressure hot water washer check the most important visual

parts.

High pressure jets can be dangerous if misused. Never direct the water jet towards people, pets, electric wiring, or the machine itself.

Spray handle and lance are affected by a thrust during operation - therefore always hold the spray lance firmly with both hands.

Never try to clean clothes or footwear on yourself or other persons.

Operator and anyone in immediate vicinity of the site of cleaning should take action to protect himself from being struck by debris dislodged during operation.

Check that cleaning will not result in dangerous substances (e.g. asbestos, oil) being washed off the object to be cleaned and harming the environment.

Do not clean sensitive surfaces made of rubber, fabrics or the



like with the zero nozzle. With the flat jet nozzle keep a distance of at least 15 cm to the surface to be cleaned.

Do not use the machine if the electric cable or the high pressure hose are damaged.

Do not cover the machine during operation or use it in a room without adequate ventilation !

If any of the machines overload protection devices trips (machine stops unintended), release the trigger of the spray handle. Lock the spray handle with locking device and turn the start/stop switch to position „OFF“.

Refer to section "7 Trouble Shooting".



The machine must be placed in a room where it is not exposed to frost.

Never start the cleaner without water supply. Even a short water deficiency can damage the sleeves of the pump.

Operation

Avoid damage to the electric cables such as squeezing, pulling, knots etc. and keep them away from sharp or hot objects.

Avoid damage to the high pressure hose such as running over by vehicles, squeezing, pulling, knots/kinks etc. and keep it away from oil and sharp or hot objects, as such may cause the hose to burst.

The cleaner can be used in zones classified as ZONE 2.

Important! Never use the machine in an environment where there could be a danger of explosion (according to EN-50014).

Important! When the system has been in operation and thereafter stopped, there might still be a working pressure in the pipeline and high pressure hoses. Therefore you should

pay special attention to the following:

- Never dismount the high pressure hose from the machine during operation. Disconnect the machine, close the shut-off cock and relieve the high pressure hose of pressure prior to dismounting.
- Never dismount the high pressure hose from the outlet point before it has been securely closed and the high pressure hose has been relieved of pressure.
- Prior to any service interference in the machine it should be disconnected and the system relieved of pressure by activating the trigger of the spray handle.

Repair and Maintenance

Only carry through the maintenance operations described in the operating instructions. Only use original Nilfisk-ALTO spare parts.

Do NOT make any technical modifications to the high pressure hot water washer.

Warning! High pressure hoses, nozzles and couplings are important for the safety when operating the machine. Only use the high pressure hoses, nozzles and couplings prescribed by Nilfisk-ALTO! For major repairs, please contact your nearest Nilfisk-ALTO service organisation.

Mains power connection



This product is intended for stationary installation only and is supplied without a power cord! Only let an authorized electrician connect the machine to the mains supply !

The following points must be observed:

- Check that the voltage stated on the data plate corresponds to your mains voltage.
- Make sure that the power cord contains the right number of wires (including ground wire) and that each wire has the right dimensions to carry the load (amperage) stated on the data plate of the machine.
- Make sure that the installation (cables, connection points and fuses) is correctly dimensioned for the load of the machine - refer to the data plate of the machine.

If not required by local legislation, we strongly recommend you to connect the machine to a power source with a Residual Current Device (RCD) which will disconnect the power supply if the leakage current exceeds 30 mA for 20 milli seconds !

See section "3.5 Mains power connection" for further instructions.

Only let a qualified electrician maintain the electric installation.

Safety Devices

Safety Valve

The pressure side of the high pressure pump is fitted with a safety valve. This valve leads the water back to the suction side of the pump when the spray handle is closed or if a nozzle is blocked.

The safety valve is adjusted and sealed by the producer. **THIS ADJUSTMENT MUST NOT BE CHANGED !**

Machine protection

The machine features an over-current protection and built-in thermal protection of the motor. In the event of increased power consumption (maloperation)



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and in the event of excessive motor temperature (obstructed ventilation etc.), the entire machine will automatically be disconnected from the mains supply.

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Short circuit protection

The machine is equipped with a short-circuit protection. In the event of short-circuits in the machine, the protective device will disconnect the entire ma-

chine from the mains supply.

2 Description

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

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.

Section 4 describes how to use

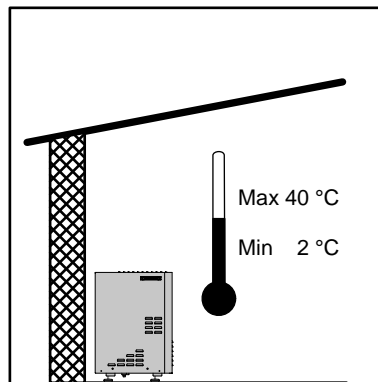
2.2 Operation elements

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

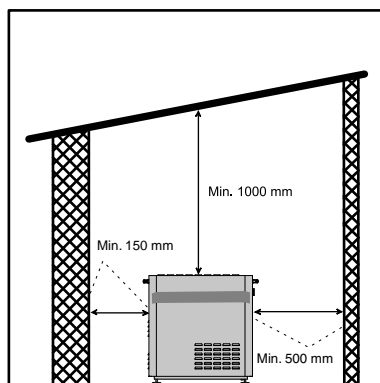
3 Installation

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.

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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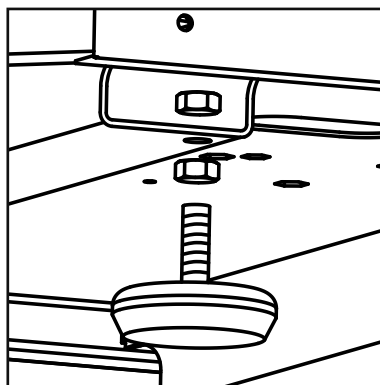
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3.3 Mounting of feet and levelling of machine

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.

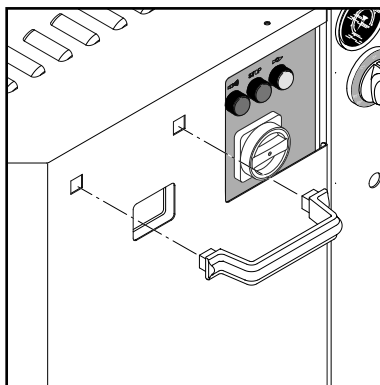


Place the machine on a plane floor.

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

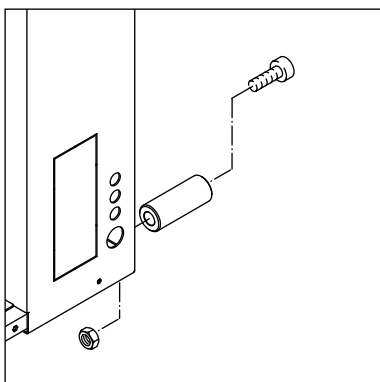
Next cross-tighten the lock nuts around the flange. It is important that all 4 feet are in contact with the floor.

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.

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3.6 Water connection

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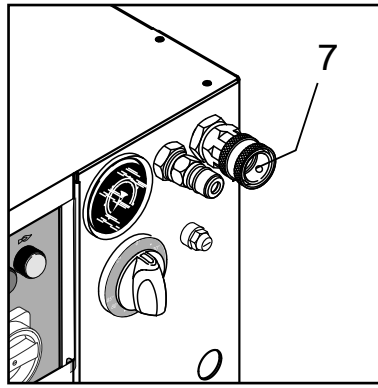
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that the water supply is within the following specifications and that the water does not contain particles such as floating sand. Min. water inlet pressure: 1 bar (at the required flow rate of the machine - see data plate). Max. water pressure: 10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

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-ALTO 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

All SOLAR BOOSTER 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).

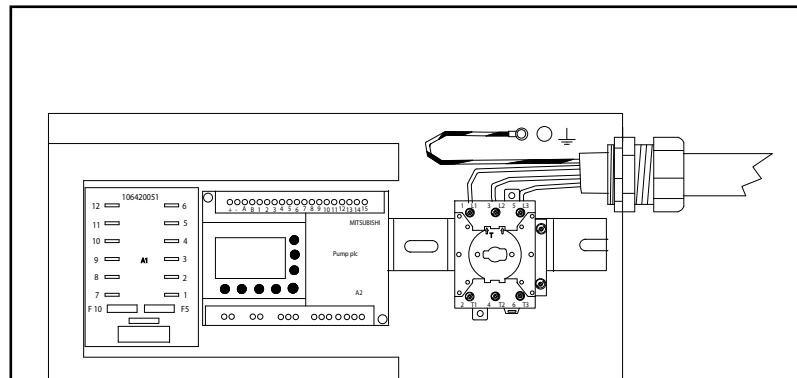
3.7 Mains power connection




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.



- 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"!

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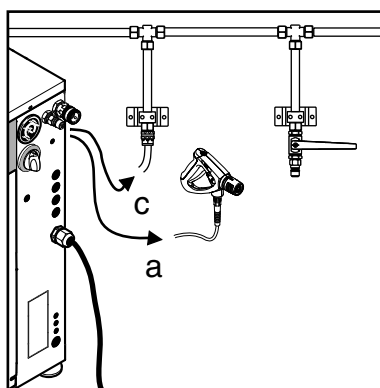
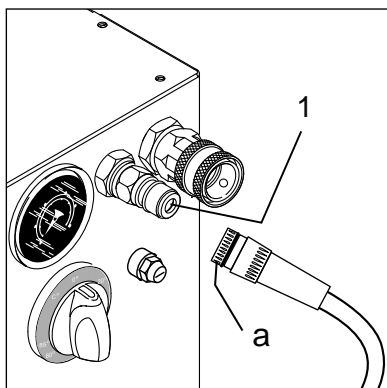
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3.8 High pressure connection



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-ALTO distributor for further information about hose dimension.

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

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3.9 Venting (D models)

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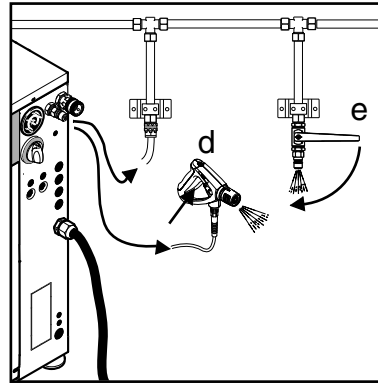
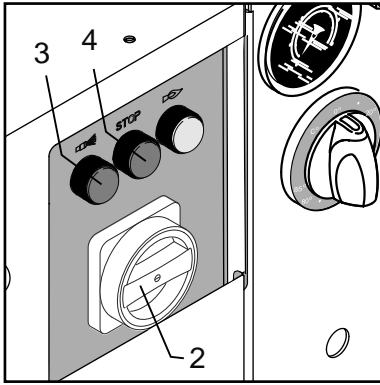
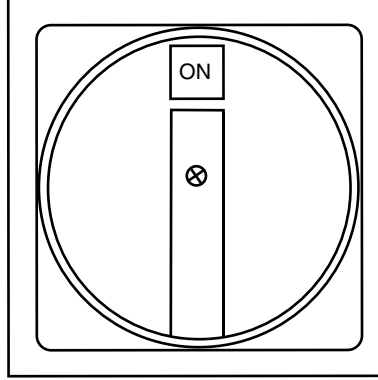
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When the SOLAR BOOSTER is properly connected to supply water, electrical installation and a high pressure hose (or pipeline) the high pressure pump must be vented before it is operational.



1. Turn the main switch, (2) to position "ON".
2. Push the "START" button (3), and the SOLAR BOOSTER 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 SOLAR BOOSTER by pressing the "STOP" push button (4).

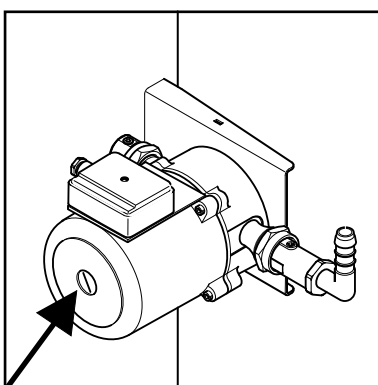
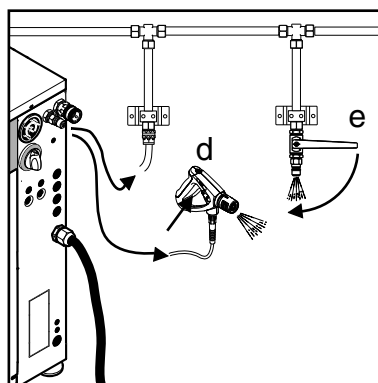
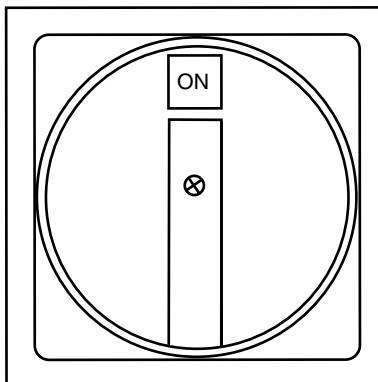
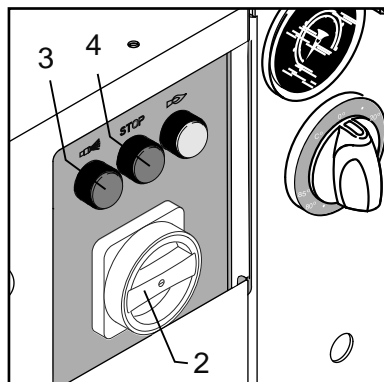
The SOLAR BOOSTER is now vented.



3.10 Venting - SOLAR BOOSTER EH models

When the SOLAR BOOSTER 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 SOLAR BOOSTER 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-ALTO 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 SOLAR BOOSTER by pressing the "STOP" push button (4).

The SOLAR BOOSTER is now vented.

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3.11 Connecting to external fuel supply – D-models

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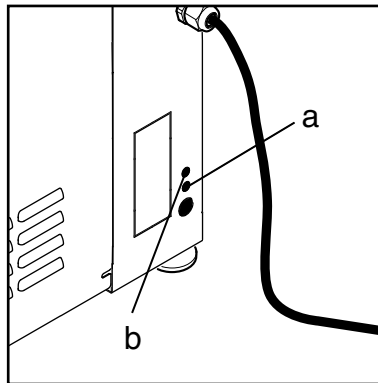
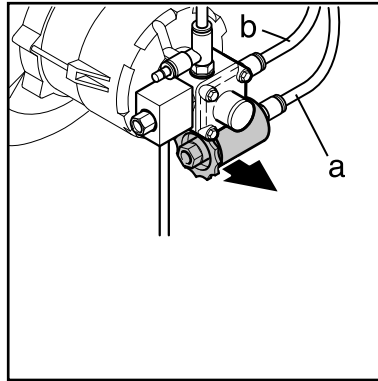
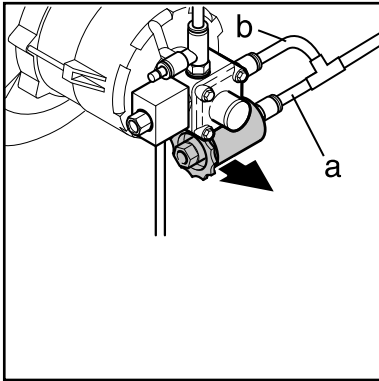
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All SOLAR BOOSTER D- models must be connected to an external fuel supply (canister or tank) as no internal provision is made for storing fuel.

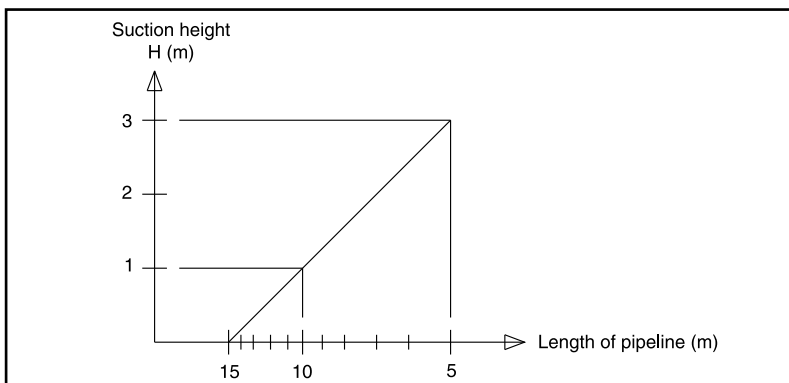
You can choose between one- and two-string connection, where "one"-string only has one supply hose (a) and "two"-string has an additional return hose (b) - see illustration.

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 SOLAR BOOSTER 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-ALTO high pressure cleaners.
- 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.



4 Operation

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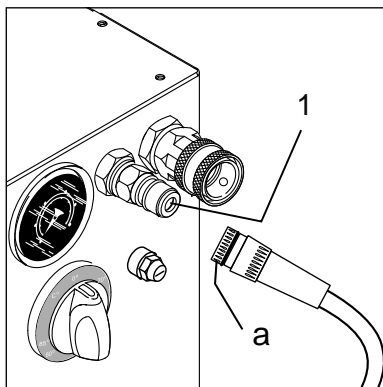
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4.1 Connections

4.1.1 High pressure hose - directly on the machine



The Nilfisk-ALTO 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.

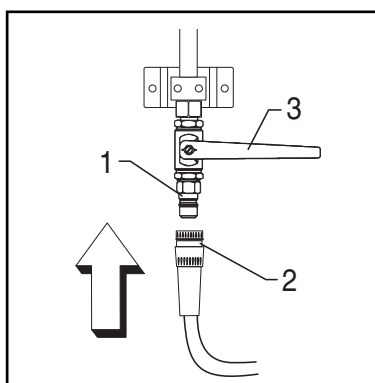
Danger of scalding!

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.

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4.1.3 Spray handle - accessories

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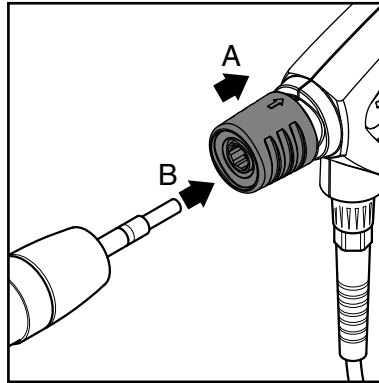
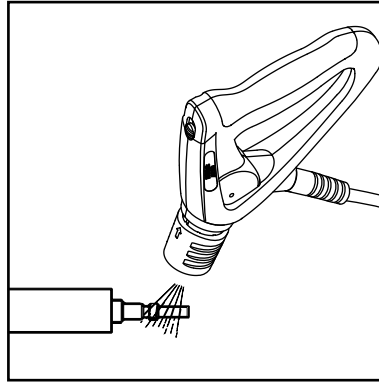
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NOTE!

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.

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.

4.1.5 Application of detergents (external)

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-ALTO sales representative for your optimal solution.

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

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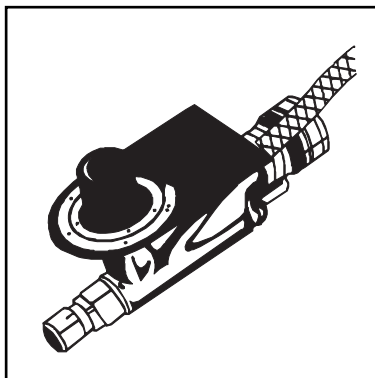
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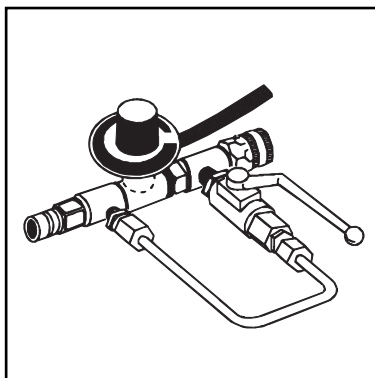
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Outlet point with detachable injector

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

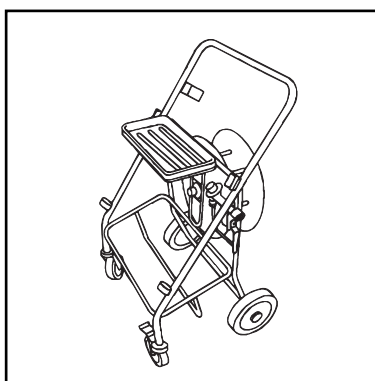
Dosage 1-8%.



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.

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4.1.6 Application of detergents (internal)

If your SOLAR BOOSTER 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.

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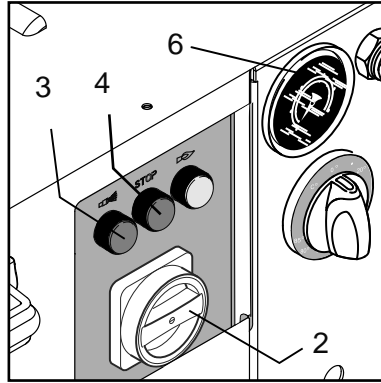
4.2 Operation
4.2.1 Starting up

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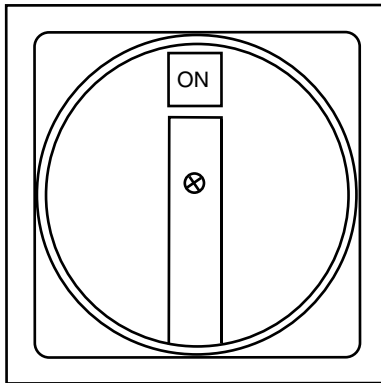
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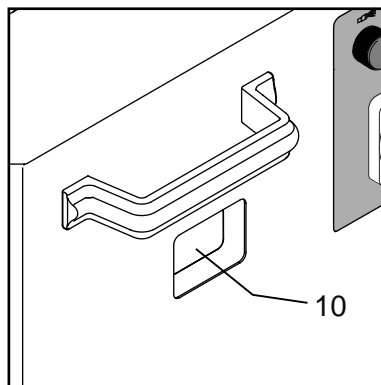
The shut-off cock on the water inlet should be open, and the spray handle on the high pressure hose should be closed.

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 SOLAR BOOSTER stops within appr. 20 seconds with the green “START” push button (3) lit. The SOLAR BOOSTER is now in “Stand-by” mode waiting for the operator to activate the spray handle.

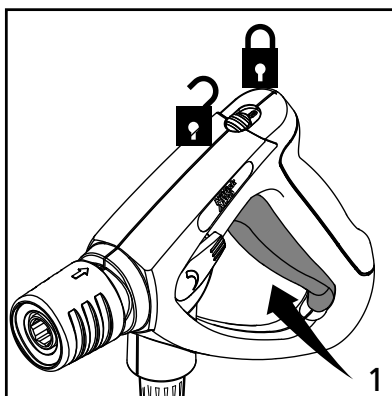


If a pressure is not being built up, vent the machine as described in sections **3.7 - 3.8 Venting**.



If the motor of the SOLAR BOOSTER 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**".

4.2.2 Automatic start/stop



Always hold the spray lance with both hands!

The SOLAR BOOSTER 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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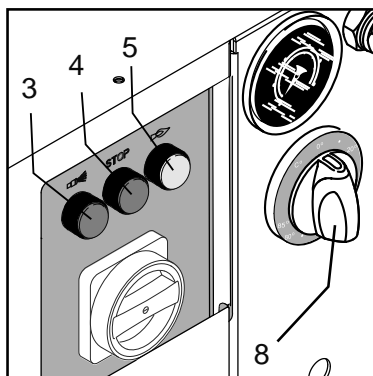
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4.2.3 Running with hot water

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

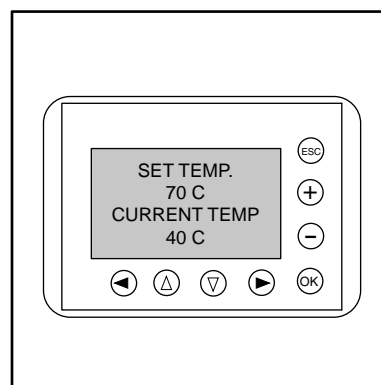
The heating source can be switched on or off at convenience by pushing the yellow "Heating" push button (5). Pushing the button once will turn on the lamp in the button and switch ON the heating source.

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



SOLAR BOOSTER will monitor the water temperature and regulate the heating source to provide the preset temperature.

On EH-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

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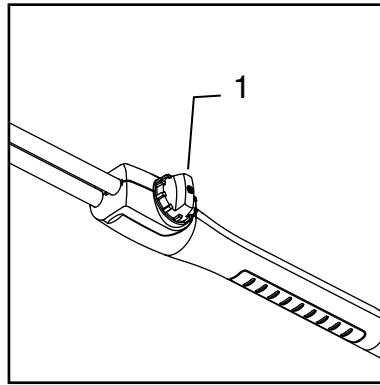
is flowing out of the SOLAR BOOSTER – “Working mode”. As the hot water does not have to pass through the high pressure pump the maximum temperature can be as high as 99°C.

If an error occurs to the heating system of the SOLAR BOOSTER, 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 SOLAR BOOSTER 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.

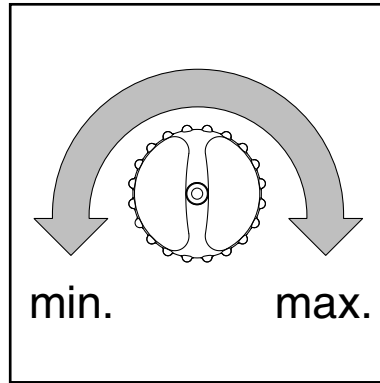
High pressure mode

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

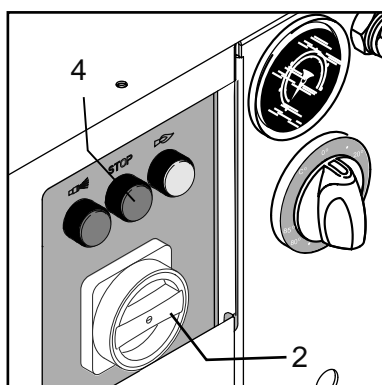
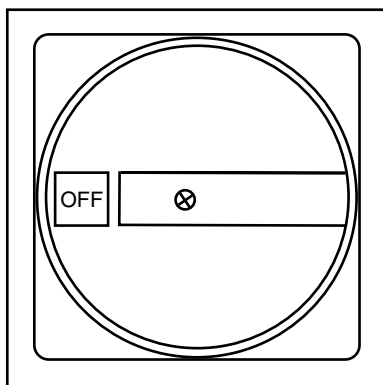


Danger of scalding!

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.



1. To stop the machine push the red "STOP" button (4). The red light will come on. To disconnect the SOLAR BOOSTER 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.

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4.2.6 Automatic "system shut-down"

Your SOLAR BOOSTER features a function called "system shut-down".

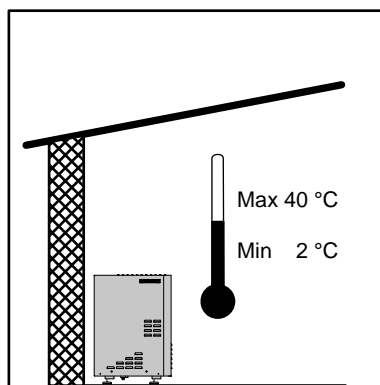
If this function is activated the SOLAR BOOSTER will automatically shut down if it has not been used in a period preset by the user (1 sec. - 9 hours).

On the SOLAR BOOSTER EH-model it will be possible to automatically stop the heating of the water in the water tank if

the SOLAR BOOSTER 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-ALTO 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.

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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.

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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-ALTO 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-ALTO 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-ALTO 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-ALTO 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-ALTO and the supplier.

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

Nilfisk-ALTO 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.



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5.6 Working methods

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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

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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-ALTO representative in order to discuss the best solution for your own cleaning tasks.

6 Maintenance

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

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

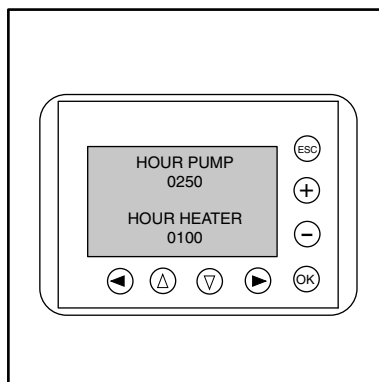
Prior to attaching the water hose and the high pressure hose, the quick couplings should be cleaned of dust and sand. Flush if necessary. This will prevent premature clogging of filters.

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.

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		●		●

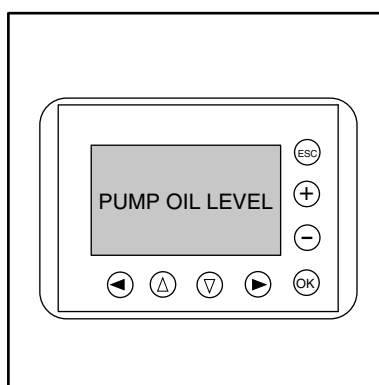
6.1 Hour counters



Your SOLAR BOOSTER 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 SOLAR BOOSTER 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 SOLAR BOOSTER will stop (or not be able to start) with an error indication "PUMP OIL LEVEL" in the inspection window.

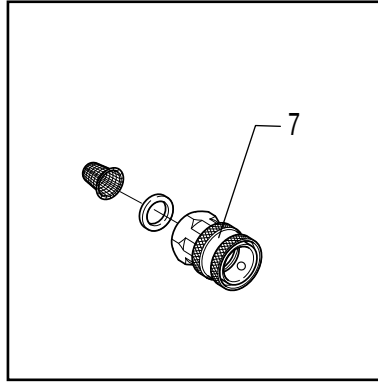
Topping up the oil cup will be possible with the cabinet removed, but you should send for a Nilfisk-ALTO service technician as soon as possible to disclose the cause of the oil loss.

PROTECT THE ENVIRONMENT

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

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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

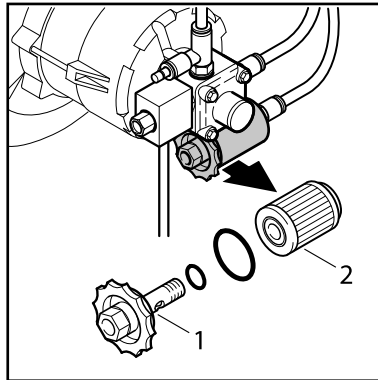
A clogging up in the nozzle will cause the pump pressure to increase above normal operating pressure, and cleaning of the nozzle is required immediately.

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.



7 Trouble Shooting

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You have chosen the best quality and therefore deserve the best service. All SOLAR BOOSTER feature an "Error detection system" that will stop the SOLAR BOOSTER 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-ALTO service organisation. To avoid unnecessary disappointments, you should check section "7.1 General trouble shooting" before contacting the nearest Nilfisk-ALTO service organisation.

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

7.1 General trouble shooting - all SOLAR BOOSTER 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.

EN	Symptom	Reason	Action
DE			NB! Avoid long extension hoses with many couplings.
FR		> Air in the system	<ul style="list-style-type: none"> • Vent the system (see section 3.7).
NL		> Detergent container empty	<ul style="list-style-type: none"> • Refill or close dosing valve.
ES		> Water inlet filter clogged up	<ul style="list-style-type: none"> • Clean filter (see sect. 6.3).
IT	No working pressure	> Nozzle clogged up	<ul style="list-style-type: none"> • Clean nozzle (see sect. 6.4).
RU		> No inlet water	<ul style="list-style-type: none"> • Check that the shut off cock of the water inlet is open. Check that the water supply meets the requirements (see section 1.2).
HU		> High pressure cock of outlet point open	<ul style="list-style-type: none"> • Close all high pressure cocks not in use.
	Machine starts and stops	> Leaky hose/ pipeline/spray handle	<ul style="list-style-type: none"> • Repair leak.

7.2 Errors messages, SOLAR BOOSTER ExxH (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-ALTO service.

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

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7.3 Error messages, SOLAR BOOSTER D (diesel heated) models

If your SOLAR BOOSTER 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-ALTO service technician.

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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-ALTO 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 SOLAR BOOSTER. > If Option "Low water security" mounted – lack of inlet pressure can be the reason	<ul style="list-style-type: none"> Call Nilfisk-ALTO 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-ALTO service.
Flow failure E4	> Defective or mal-adjusted flow sensor	<ul style="list-style-type: none"> Call Nilfisk-ALTO 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-ALTO service. Call Nilfisk-ALTO 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-ALTO service

8 Technical Data



SOLAR BOOSTER PROGRAM		SOLAR BOOSTER 7-38E18H	SOLAR BOOSTER 7-58E18H	SOLAR BOOSTER 7-58E18H	SOLAR BOOSTER 7-58E18H	SOLAR BOOSTER 7-58E36H	SOLAR BOOSTER 7-58E54H	SOLAR BOOSTER 7-58E54H
Item Nr.		107370260	107370270	107370272	107370274	107370276	107370278	107370278
Performance data :								
Pump pressure	[bar]	135	170	170	170	170	170	170
Q _{jec}	[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	28	42	42	42
Heating power	[kW]	18	18	18	36	54	54	54
Efficiency	[%]	99	99	99	99	99	99	99
Weight (empty)	[kg]	150	155	155	156	157	157	157
Max. sound power level	[dB(A)]	93	93	97	93	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
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	400	400	400	440
Current - Max. consumption	[amp]	35,9/~3	39,4/~3	39,4/~3	65,3/~3	91,2/~3	91,2/~3	91,2/~3
Power consump. (heating+motor)	[kW]	18 + 5,8	18 + 7,5	18 + 7,5	36 + 7,5	54 + 7,5	54 + 7,5	54 + 7,5
Frequency	[Hz]	50	50	60	50	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		•	•	•	•	•	•	•



SOLAR BOOSTER PROGRAM		SOLAR BOOSTER 5-52D	SOLAR BOOSTER 7-58D	SOLAR BOOSTER 7-58D	SOLAR BOOSTER 7-58D	SOLAR BOOSTER 7-58DS	SOLAR BOOSTER 8-103D
Item Nr.		107370055	107370070	107370072	107370075	107370077	107370080
Performance data :							
Pump pressure [bar]		165	170	170	160	170	180
Q _{tec} [l/h]		1000	1110	1110	1110	1110	1900
Cleaning Impact [kg-force]		5,2	5,8	5,8	5,8	5,8	10,3
Δ temp - (Full flow) [°C]		65	76	76	74	76	49
Heating power [kW]		80	115	115	115	115	115
Efficiency [%]		92	92	92	92	92	94
Weight (empty) [kg]		189	212	212	212	212	232
Max. sound power level [dB(A)]		92	93	97	93	93	93
Motor / Pump :							
Nozzle type		600	680	680	700	680	1100
Q _{max} [l/h]		1100	1200	1200	1200	1200	2000
Pump type		NA5	C3	C3	C3	C3	AR
Motor output power [kW]		6,7	6,5	6,5	6,5	6,5	11,0
Motor / pump [rpm]		1450	1450	1450	1450	1450	1450
Pump drive		Direct	Direct	Direct	Direct	Direct	Direct
Connection requirements :							
Voltage [V]		400	400	440	230	400	400
Current - Max. consumption [amp]		15/~3	15/~3	15/~3	25/~3	15/~3	24/~3
Power consump. (heating+motor) [kW]		1,4 + 6,9	1,4 + 7,5	1,4 + 7,5	1,4 + 7,1	1,4 + 7,5	1,4 + 12,7
Frequency [Hz]		50	50	60	50	50	50
Min. inlet water pressure (full flow) [bar]		1,0	1,0	1,0	1,0	1,0	1,0
Heating :							
Boiler type		EcoPower 5	EcoPower 7	EcoPower 7	EcoPower 7 (SS coil)	EcoPower 7	EcoPower 7
Max. inlet temperature [°C]		30	30	30	30	30	30
Max. outlet temperature [°C]		99	99	99	99	99	99
Burner fuel type		Diesel	Diesel	Diesel	Diesel	Diesel	Diesel
Fuel consumption @ΔT=40°C [kg/h]		4,8	4,9	4,9	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		•	•	•	•	•	•

9 Warranty

Your Nilfisk-ALTO 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-ALTO-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).

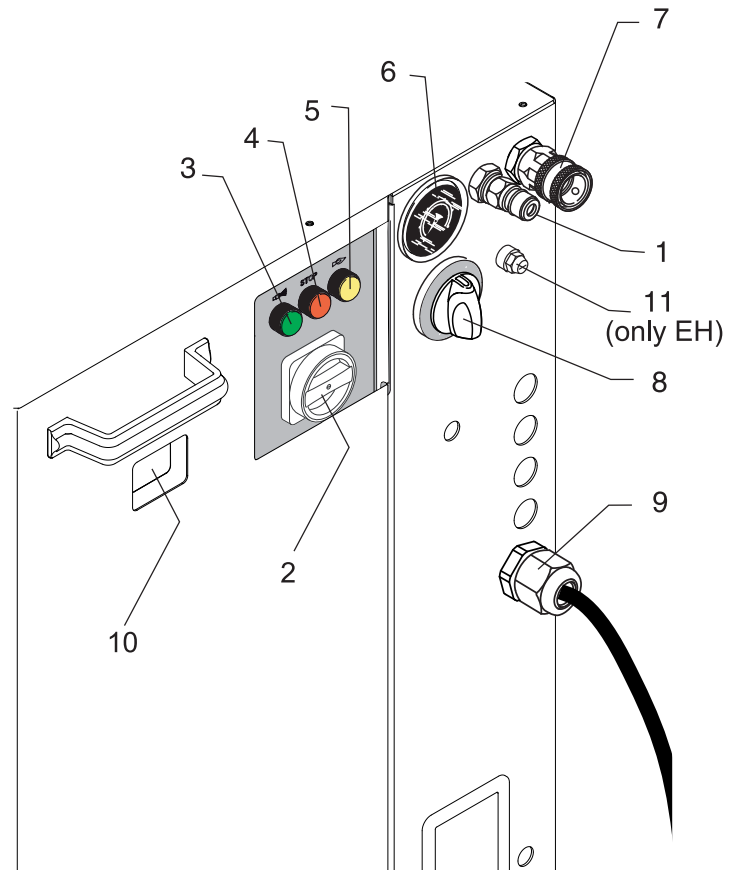
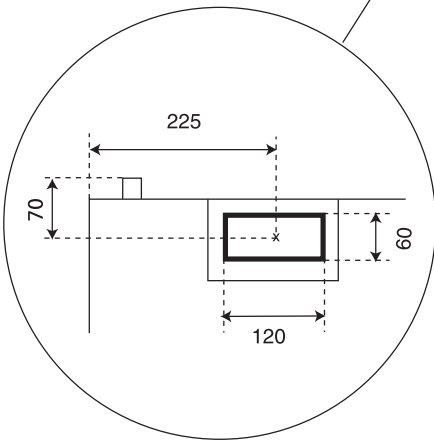
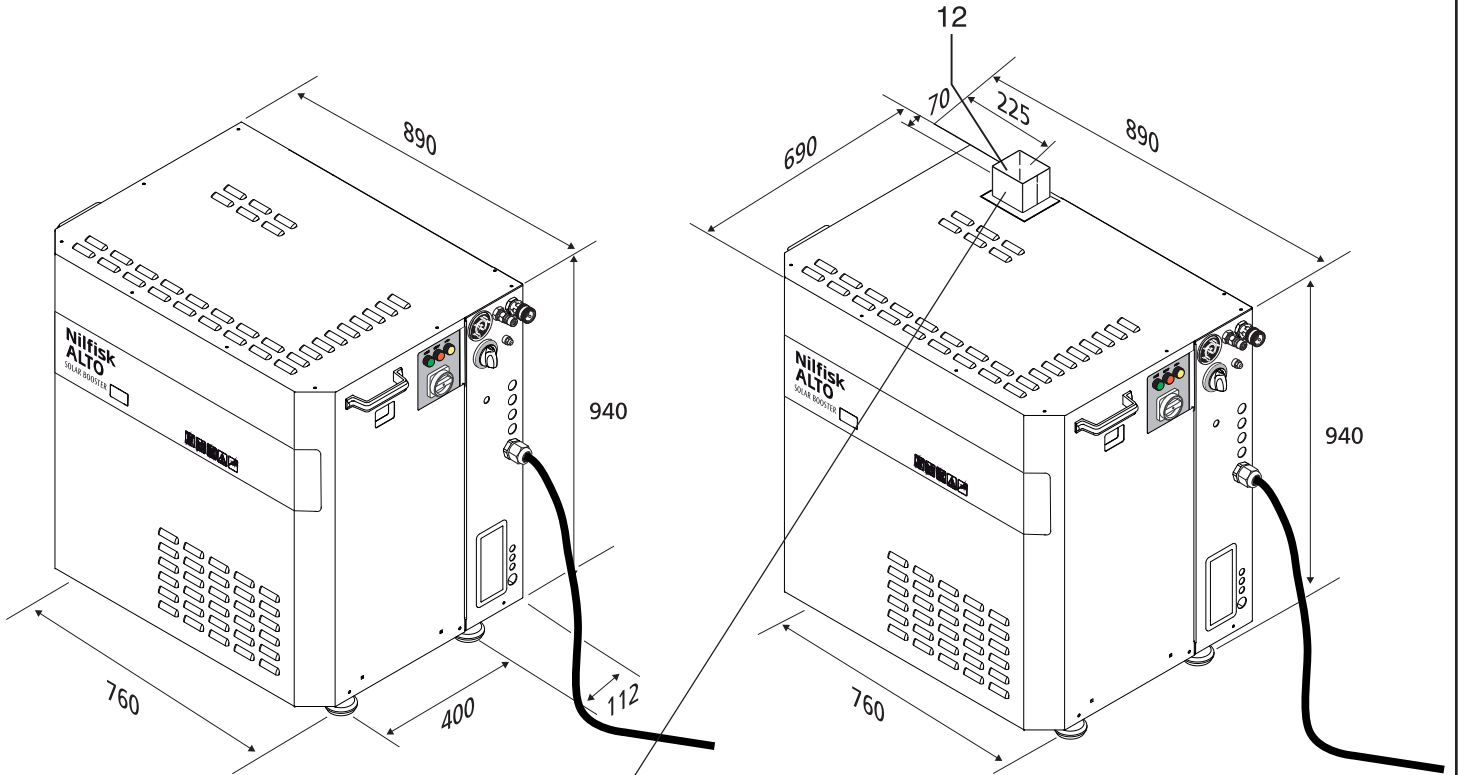


10 Declaration of Conformity

 Declaration of Conformity	
Product:	High Pressure Washer
Type:	SOLAR BOOSTER D, EH
The design of the unit corresponds to the following pertinent regulations:	EC Machine Directive 2006/42/EC EC Low-voltage Directive 2006/95/EC EC EMC Directive 2004/108/EC EC RoHS Directive 2011/65/EC EC PED Directive 97/23/EC
Applied harmonised standards:	EN 60335-2-79 (2006), EN 55014-1 (2006), EN 55014-2 (2001), EN 61000-3-2 (2006)
Applied international standards and technical specifications:	IEC 60335-2-79 (2007)
Name and address of the person authorised to compile the technical file:	Anton Sørensen General Manager, Technical Operations EAPC Nilfisk-Advance A/S Sognevej 25 DK-2605 Brøndby
Identity and signature of the person empowered to draw up the declaration on behalf of the manufacturer:	 Anton Sørensen General Manager, Technical Operations EAPC Nilfisk-Advance A/S Sognevej 25 DK-2605 Brøndby
Place and date of the declaration:	Hadsund, 02.2013

SOLAR BOOSTER EH

SOLAR BOOSTER D



Nilfisk ALTO

works for you

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