

# Operating instructions



## SOLAR BOOSTER G/GH/GW



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# 1 Safety Precautions and Warnings



Before starting up your high pressure hot water washer for the first time, this instruction manual must be read through carefully. Save the instructions for later use.

Only let instructed people operate the machine.

## 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.

Never let children operate the machine.

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 dismantle 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 dismantling.
- Never dismantle 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 an electric plug! 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 "3.7 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 !**

#### *Motor protection*

The machine features an over-current protection and built-in thermal protection of the motor. In the event of increased power consumption (maloperation) and in the event of excessive motor temperature (obstructed ventilation etc.), the entire machine will automatically shut down.

#### *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 shut down the machine.

## EN 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

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 the high pressure hot water washer.

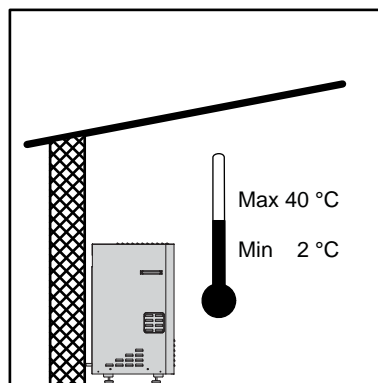
### 2.2 Operation elements

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 Chimney
- 12 Data plate
- 13 Measuring point, exhaust gases
- 14 Overheat fuse - resettable

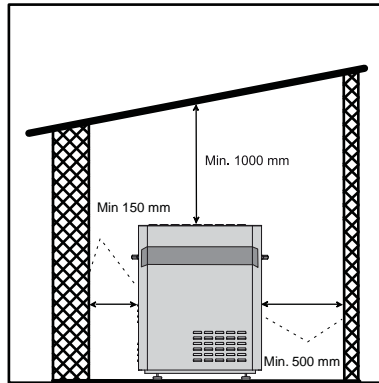
## 3 Installation

### 3.1 Installation 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. Air humidity: max. 80% relative humidity.

### 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.

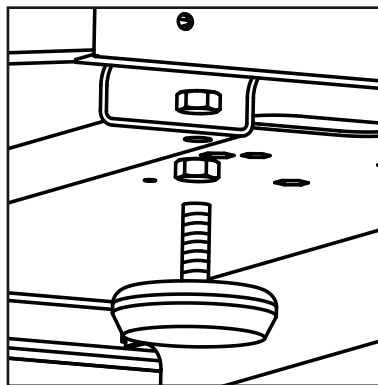


### 3.3 Mounting of feet and levelling of machine

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.

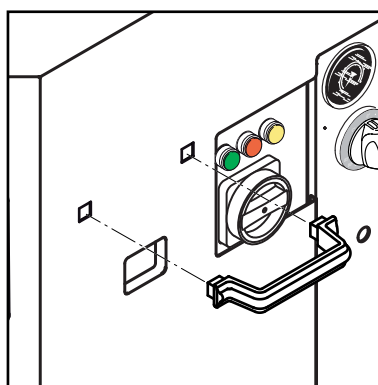
**IMPORTANT:** Of safety reasons it is important that the SOLAR BOOSTER is level because of the functionality of the boiler drain.



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.

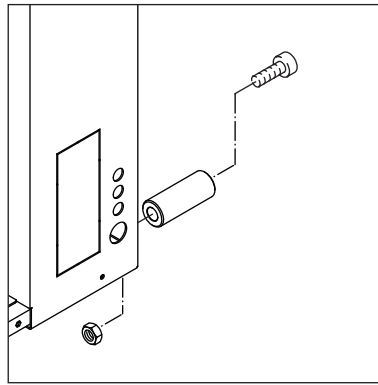
### 3.4 Mounting of handle



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

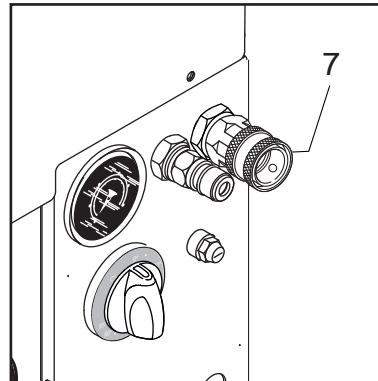


### 3.5 Mounting of spacers



Mount the enclosed spacers at the back of the machine.

### 3.6 Water connection



the 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.:  
SOLAR BOOSTER GH: 85°C.  
SOLAR BOOSTER G: 35°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.

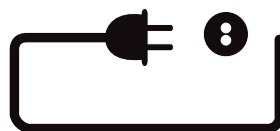
The connection can be made to a public drinking water supply network or a private water supply. A shut-off cock should be mounted on the water supply network in the immediate vicinity of the machine. Make sure that the water supply is within

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).

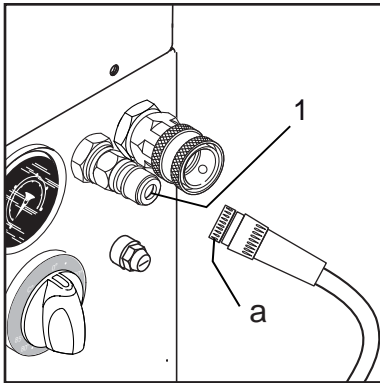
### 3.7 Mains power connection



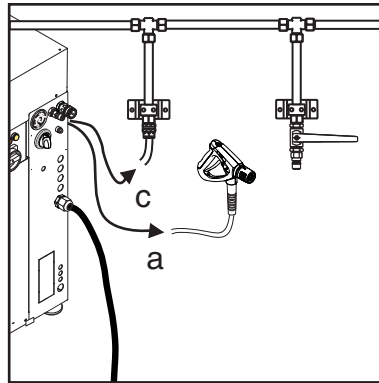
**CAUTION!** An authorized electrician must perform the electrical connection of the machine to the main power supply. Refer to section "1 Safety precautions and warnings".



### 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 (1). Contact your Nilfisk-ALTO distributor for further information.

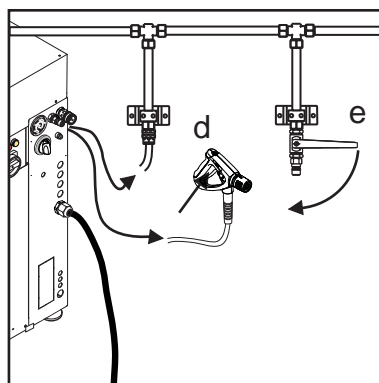
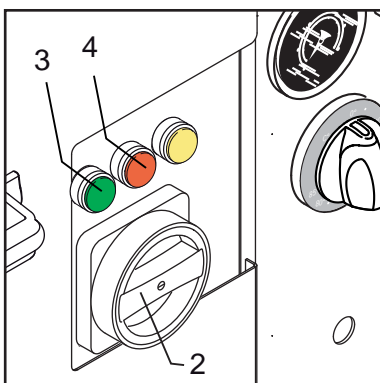
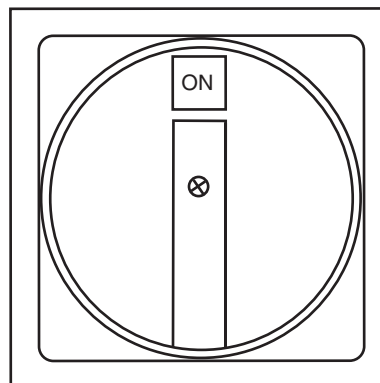


It is recommended to let a service technician authorized by Nilfisk-ALTO prepare the pipeline.

### 3.9 Venting SOLAR BOOSTER G

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.

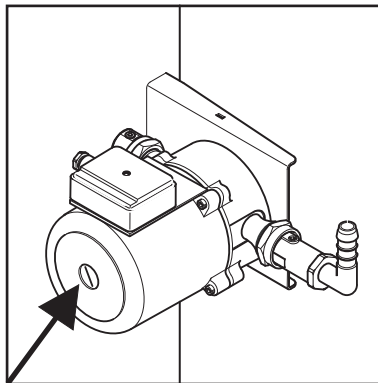
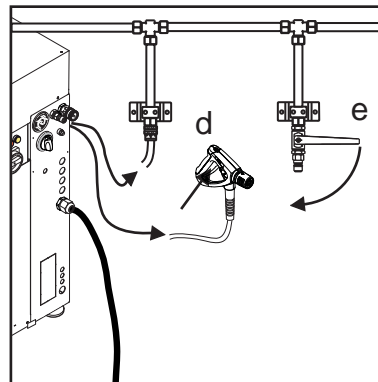
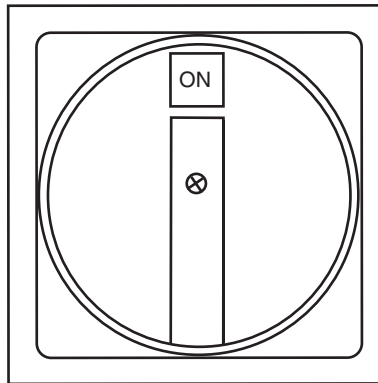
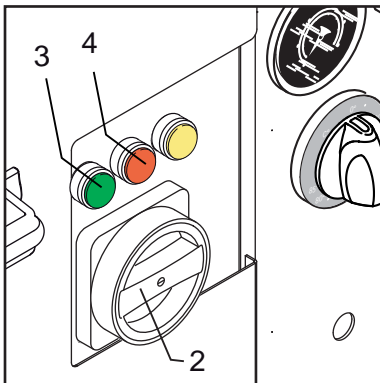
1. Turn the main switch, (2) to position "ON".
2. Push the "START" button (3), and the SOLAR BOOSTER will start.
3. Open the outlet point (spray handle on high pressure hose, (d) or outlet on piping system (e) without having a spray lance connected.
4. Let the water run until all air has escaped from 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, should vent the system.
7. Stop the SOLAR BOOSTER by pressing the "STOP" push button (4).



The SOLAR BOOSTER is now vented.

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. It is important that the heating tank is filled with water before the venting can take place. Pushing the "START" push button (3) and keeping it depressed will do this. The in-



- let solenoid valve then opens and allows water to enter the heating tank. When the tank is full, the solenoid valve will automatically shut off, and the SOLAR BOOSTER will start. This procedure will be necessary whenever the tank is emptied – i.e. during service.
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 center 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.

### 3.11 Connecting to gas supply

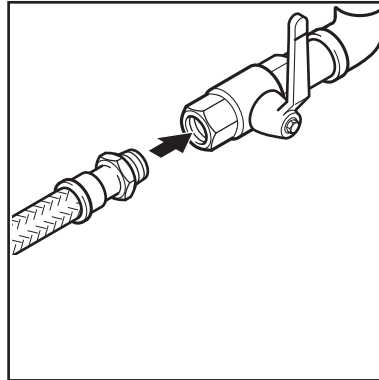
All SOLAR BOOSTER models are equipped with a Bentone gas burner.

An authorized gas technician must perform connection of the gas burner to the public gas supply and adjust it. A pre-

adjustment was made in the factory).

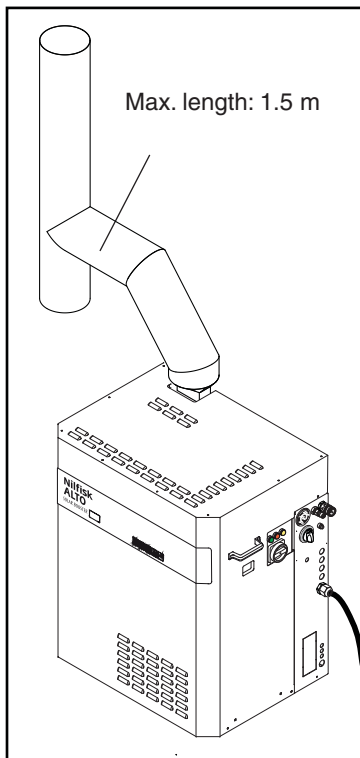


Make sure that the SOLAR BOOSTER is connected to the gas supply with a flexible, approved hose - at least 1 m long. This will eliminate vibrations of the machine to the gas supply line and hereby prevent long-term damage to the gas line.

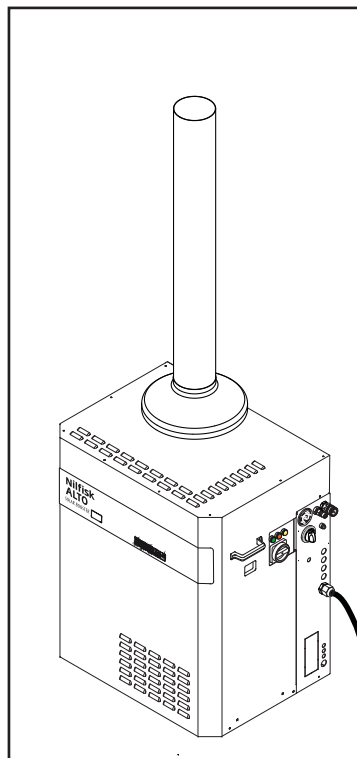


The flexible hose also makes it convenient and faster for the Nilfisk-ALTO service representative to perform service on the heating coil / heat exchanger of the SOLAR BOOSTER - not having to interrupt the gas supply.

### 3.12 Connection of funnel



Fixed funnel  
Natural draught



Cowl with draught

Standards and requirements to funnel installations may vary from country to country. Before installing the funnel, you should contact the local authorities. The following funnel connections are not legal in all countries and are therefore only intended as a guide. However, all installations must comply with the following requirement:

Max. pressure in measuring point (13): 50 Pascal.



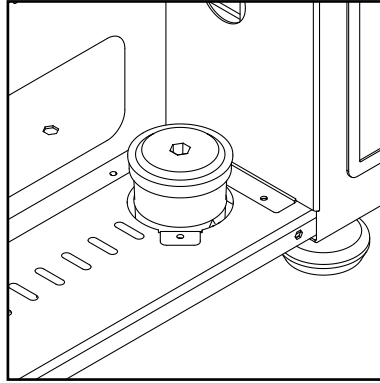
3.13

### Drain SOLAR BOOSTER G

Your SOLAR BOOSTER features a drain. The drain runs through a water cup placed underneath the electric box of the machine. In the water cup a sensor registers whether the water level is o.k. If there is not enough water in the water cup, the SOLAR BOOSTER will not start. Therefore the water cup

must be filled with distilled water before the SOLAR BOOSTER is started.

**Filling:** Dismount the cabinet and remove the cover of the water cup. Then fill with distilled water until the water runs through the drain hose and out of the water cup.



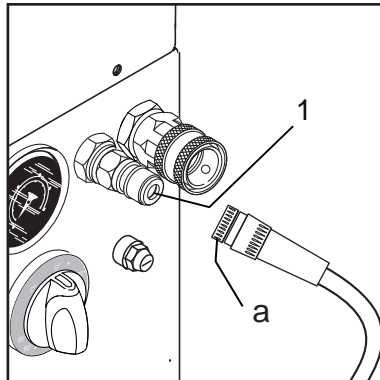
The drain hose must be guided to a sewer system. In case of local requirements to the disposal of drain water, contact the local authorities.

**NOTE:** In order that the drain will work properly it is important that the SOLAR BOOSTER is level and that the drain hose is not placed above the level of the boiler bottom.

# 4 Operation

## 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).

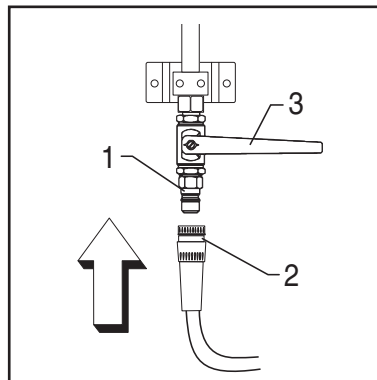
Max. extension hose: 50 m.

**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.

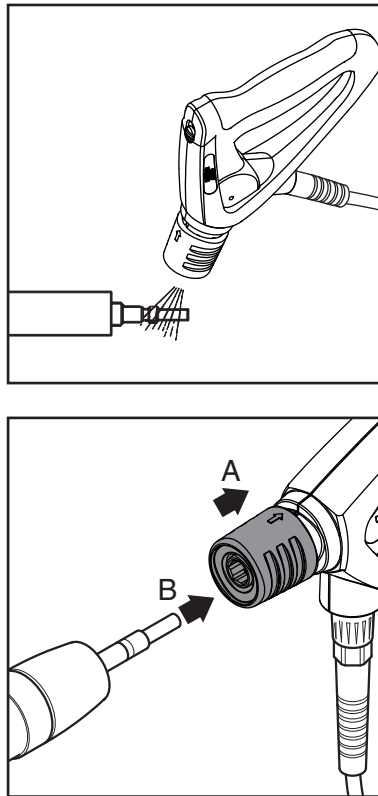
**Danger of scalding!**  
Never dismount high pressure hoses at water temperatures above 50°C.



**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.



### 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 trigger.
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. 0680.

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.

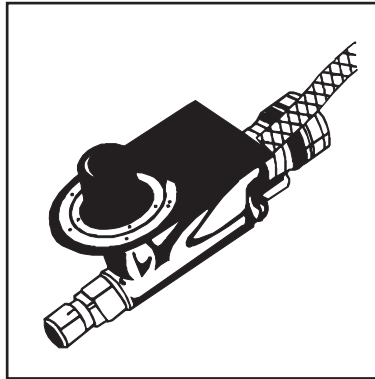
#### 4.1.5 Application of detergents (external)

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.



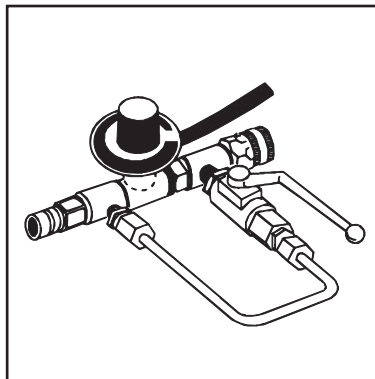
Below you will find various types of outlet points with injectors.



##### **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.

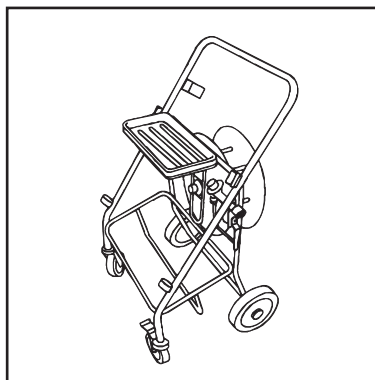
Dosage 1-8%.



##### **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.

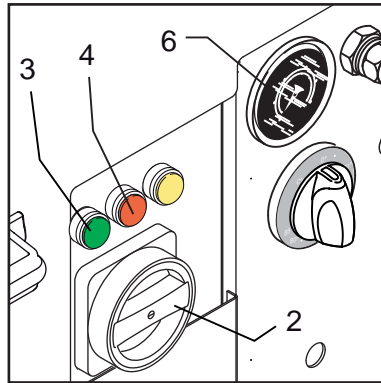


#### 4.1.6 Application of detergents (internal)

If your 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.

### 4.2 Operation

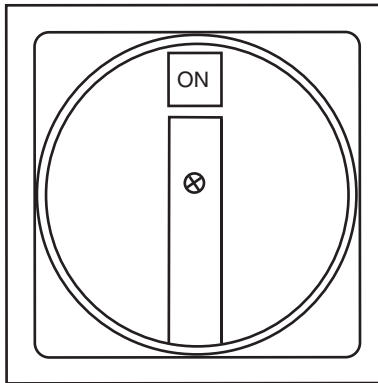
#### 4.2.1 Starting up



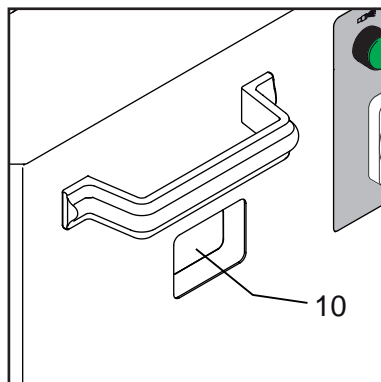
The shut-off cock on the water inlet should be open, and the spray handle on the high pressure hose should be closed.

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 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 **3.9 - 3.10 Venting**.

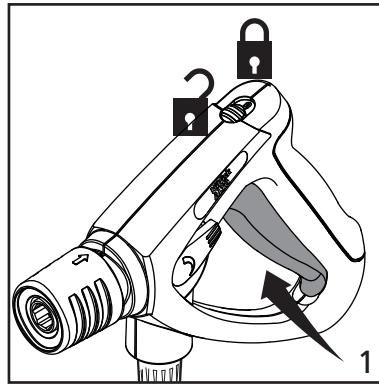


If the motor of the SOLAR BOOSTER does not start or stops unintendedly with the red “**STOP**” push button (4) flashing, an error is present. Read the error message through the “Inspection window” and refer to section “**7 Troubleshooting**”.



#### 4.2.2 Automatic start/stop

**Always hold the spray lance with both hands!**



The SOLAR BOOSTER is automatically started 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.



#### 4.2.3 Running with hot water

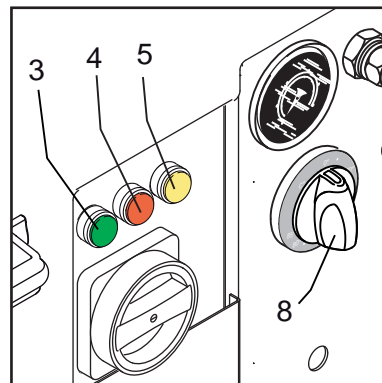
The SOLAR BOOSTER is equipped with a gas burner and a boiler to heat the water.

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.

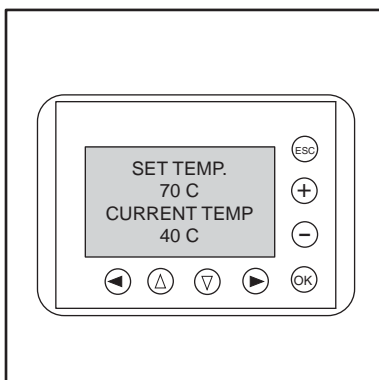
Pushing the button again will turn out the lamp in the button and switch OFF the heating source.

On GH-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 G-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 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.



On the G-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.

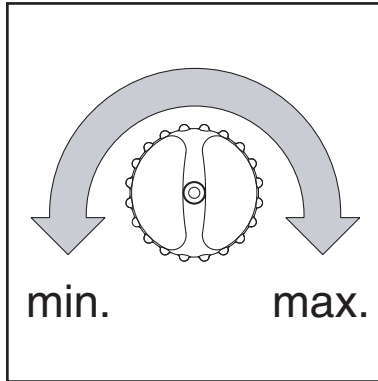
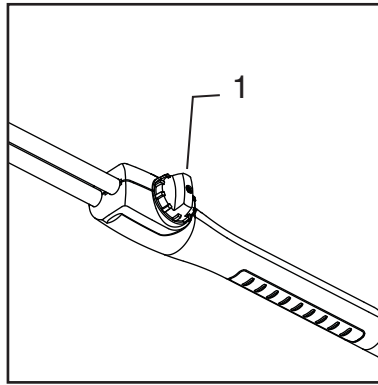


If an error occurs to the heating system of all SOLAR BOOSTERS, the machine stops and the red "STOP" push button (4) will start flashing and the heating source will be shut off. Press the red button to re-set the machine. The SOLAR BOOSTER will continue to be functional with non heated water by pushing the green "START" push button (3).

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, both spray lances are used - **low pressure mode** / possibility of dosing detergents.

The pressure may be regulated between these positions.

#### 4.2.5 Stop

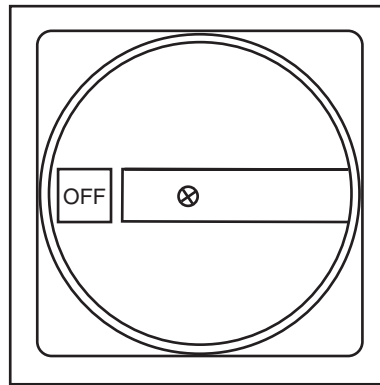
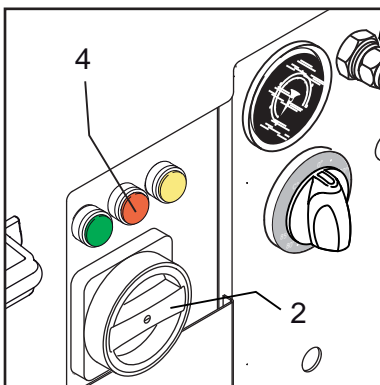


##### Danger of scalding!

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

Prior to dismounting 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.

#### 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).

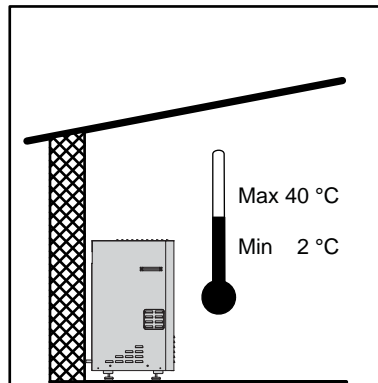
On the SOLAR BOOSTER GH-model it will be possible to automatically stop the heating of the water in the water tank if

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.

## 5 Fields of Application and Working Methods

### 5.1 Fields of application

The most important fields of application for this product are:

<b>Agriculture</b>	Cleaning of machinery, agricultural implements, stalls, equipment and buildings.
<b>Transport</b>	Cleaning of trucks, buses, cars etc.
<b>Building &amp; Construction</b>	Cleaning of vehicles, equipment, buildings etc.
<b>Light industry</b>	Degreasing and cleaning of machines, workpieces, and vehicles.
<b>Service</b>	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:

<b>Low pressure</b>	Is first and foremost used for the application of detergents and for flushing.
<b>High pressure</b>	Is used during the actual cleaning.
<b>Intermediate pressure</b>	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 avail-

able 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.

Contact your Nilfisk-ALTO distributor for directions as to which product(s) will fulfill 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.

## 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.

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.



## 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 resi-

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

**5.7.2 Vehicle**

Task	Accessories	Method
<b>Vehicle body-work</b>	Standard lance Detergent injection Curved lances and underchassis washers Brushes  <b>Detergents</b> Active Shampoo Active Foam Sapphire Super Plus Aktive Wax Allosil RimTop	<ol style="list-style-type: none"> <li>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.</li> <li>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 under-carriage washers can be valuable for the cleaning of car under-chassis and wheel arches.</li> <li>3. Clean fragile areas such as motors, rubber at lower pressure levels to avoid damage.</li> <li>4. Apply a liquid wax using the pressure washer in order to protect the bodywork from pollution.</li> </ol>

Task	Accessories	Method
<b>General surfaces</b>  <b>Metallic equipment</b>	Foam injectors Standard lance Curved lances Tank cleaning head  <b>Detergents</b> Intensive J25 Multi Combi Aktive Alkafoam  <b>Disinfectant</b> DES 3000	<ol style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>3. Apply DES 3000 disinfectant once the surfaces are perfectly clean.</li> </ol> <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>
<b>Rusted or damaged surfaces prior to treatment</b>	Wet sand blasting equipment	<ol style="list-style-type: none"> <li>1. Connect the sand blasting lance to the pressure washer and place the suction tube in the sand.</li> <li>2. Always wear protective equipment during sand blasting.</li> <li>3. Spray the surfaces to be treated with the mix of water and sand. Rust, paint etc will be stripped off.</li> </ol>

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

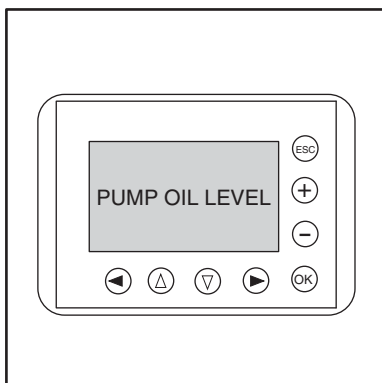
To ensure the most optimal maintenance of your SOLAR BOOSTER, you should consider making a "Service Contract" with Nilfisk-ALTO. In this way your SOLAR BOOSTER will always be ahead of potential problems.

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.

## 6.1 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 LOW" (GH) and "PUMP OIL LEVEL LOW" or "LOW WATER LEVEL IN DRAIN

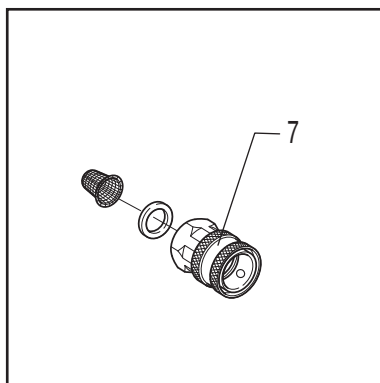
BOX (G) in the inspection window.

Topping up the oil cup will be possible with the cabinet removed, but you should send for an 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.

## 6.2 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.

## 6.3 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.

## 6.4 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



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
<b>Machine will not start</b> (NO ERROR indication)	> A fuse has blown	• Change the fuse.
	> Power disconnected	• Connect power.
<b>Fuses blow</b>	> Installation does not correspond to the ampere consumption of the machine	• Change to an installation corresponding to the ampere consumption of the machine at a minimum. Change the fuse.
<b>Working pressure too low</b>	> Nozzle worn	• Replace the nozzle.
	> Wrong spray lance	• Replace the spray lance (see section 4.1.4).
	> Reduction valve of spray lance not adjusted to max. pressure.	• Turn reduction valve completely counter-clockwise (see section 4.1.4).
	> Nozzle partly clogged up	• Clean the nozzle (see section 6.3).
<b>Working pressure fluctuating</b>	> Insufficient water supply	• 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. <b>NB!</b> Avoid long, thin hoses (min. 3/4").
	> High pressure hoses too long	• Dismount high pressure extension hoses and retry. Extension hose max. 50 m.

Symptom	Reason	Action
	<ul style="list-style-type: none"> <li>&gt; Air in the system</li> <li>&gt; Detergent container empty</li> <li>&gt; Water inlet filter clogged up</li> </ul>	<p><b>NB!</b> Avoid long extension hoses with many couplings.</p> <ul style="list-style-type: none"> <li>• Vent the system (see sections 3.9-3.10).</li> <li>• Refill or close dosing valve.</li> <li>• Clean filter (see sect. 6.2).</li> </ul>
<b>No working pressure</b>	<ul style="list-style-type: none"> <li>&gt; Nozzle clogged up</li> <li>&gt; No inlet water</li> <li>&gt; High pressure cock of outlet point open</li> </ul>	<ul style="list-style-type: none"> <li>• Clean nozzle (see sect. 6.3).</li> <li>• Check that the shut off cock of the water inlet is open. Check that the water supply meets the requirements (see section 1.2).</li> <li>• Close all high pressure cocks not in use.</li> </ul>
<b>Machine starts and stops</b>	<ul style="list-style-type: none"> <li>&gt; Leaky hose/ pipeline/spray handle</li> </ul>	<ul style="list-style-type: none"> <li>• Repair leak.</li> </ul>

## 7.2 Error messages, SOLAR BOOSTER G



If your SOLAR BOOSTER G 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 an Nilfisk-ALTO service technician.

Error Message (red STOP light flashing)	Reason	Action
<p>„Pump oil level low“ or „Low water level in drain box“</p> <p><b>E3</b></p>	<p>&gt; Level of lubricant oil of HP pump is at a low level</p>	<ul style="list-style-type: none"> <li>Remove cabinet and top up oil if no leakage is present.</li> <li>Call Nilfisk-ALTO service if oil is leaking or if water is mixed in the oil (creamy white or transparent)</li> </ul>
<p>„Overload cut out“ or „Low inlet pressure“</p> <p><b>E2</b></p>	<p>&gt; Overload or short circuit of SOLAR BOOSTER.</p> <p>&gt; If Option “Low water security” mounted – lack of inlet pressure can be the reason</p>	<ul style="list-style-type: none"> <li>Call Nilfisk-ALTO service.</li> <li>Check your water supply – open?, sufficient pressure?</li> </ul>
<p>„Water Shortage“ „No flow detected“</p> <p><b>E1</b></p>	<p>&gt; Lack of water</p> <p>or</p> <p>&gt; Defective or mal-adjusted flow sensor / pressure switch</p>	<ul style="list-style-type: none"> <li>Check your water supply – open?, sufficient pressure?</li> <li>Check and clean inlet filter, section 6.2.</li> <li>Call Nilfisk-ALTO service.</li> </ul>
<p>„Flow failure“</p> <p><b>E4</b></p>	<p>&gt; Defective or mal-adjusted flow sensor</p>	<ul style="list-style-type: none"> <li>Call Nilfisk-ALTO service.</li> </ul>
<p>„Overheat protection cut out or external control cut out“</p> <p><b>E7</b></p>	<p>&gt; Overheat sensor on boiler enclosure has tripped. Gas burner stops.</p> <p>&gt; External safety device (optional) has tripped. Gas burner stops.</p>	<ul style="list-style-type: none"> <li>Remove cabinet and check air supply to cooling fan. Clean if necessary.</li> <li>Otherwise call Nilfisk-ALTO service.</li> <li>Check external safety switch (i.e. that external exhaust fan is on = pressure guard ON).</li> <li>Otherwise call Nilfisk-ALTO service.</li> </ul>
<p>„Burner failure – press warm on and hold for two sec.“</p> <p><b>E9</b></p>	<p>&gt; The gas burner has detected an error in the burner system:</p> <ul style="list-style-type: none"> <li>Lack of gas.</li> <li>No ignition.</li> <li>Other errors.</li> </ul> <p>&gt; Condensation drain clogged up</p> <p>&gt; Condensate in boiler</p>	<ul style="list-style-type: none"> <li>Try restart of burner by pushing the “Heat ON/OFF” button for 2 sec. If burner restarts within 3 attempts, you can disregard the error and continue cleaning.</li> <li>Otherwise call Nilfisk-ALTO service.</li> <li>Dismount drain cup and clean the pipe at the bottom of the boiler.</li> </ul>
<p>„Air Control Failure“</p> <p><b>E11</b></p>	<p>&gt; The air pressure gauge on the booster blower is not activated properly.</p> <p>&gt; The booster blower is not generating sufficient pressure</p>	<ul style="list-style-type: none"> <li>Adjust the air pressure gauge</li> <li>Make sure that the booster the blower is functioning, and that inlet is not blocked.</li> </ul>

### 7.3 Error messages, SOLAR BOOSTER GH (gas heated)

If heating cannot be switched on or is switched off without any error messages, it is likely that the overheat protection (pos. 14 on illustration at the end of the manual) 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
<b>Pump oil level low</b> <b>E3</b>	> Level of lubricant oil of HP pump is at a low level	<ul style="list-style-type: none"> <li>• Remove cabinet and top up oil if no leakage is present.</li> <li>• Call Nilfisk-ALTO service if oil is leaking or if water is mixed in the oil (creamy white or transparent)</li> </ul>
<b>Overload cut out</b> <b>E2</b>	> Overload or short circuit of SOLAR BOOSTER.	<ul style="list-style-type: none"> <li>• Call Nilfisk-ALTO service.</li> </ul>
<b>Water shortage</b> <b>E1</b>	> Lack of water in heating tank	<ul style="list-style-type: none"> <li>• See section “3.10 Venting”</li> <li>• Check your water supply – open?, sufficient pressure?</li> <li>• Check and clean inlet filter, section 6.2.</li> </ul>
<b>Risk of leakage</b> <b>E8</b>	> Water inlet magnet valve has been open more than 10 minutes	<ul style="list-style-type: none"> <li>• Check the flow rate from your water supply.</li> <li>• Inlet magnet valve defective – call Nilfisk-ALTO service.</li> <li>• Leakage in tank or internal feed system – call Nilfisk-ALTO service.</li> </ul>
<b>Motor cut out</b> <b>E10</b>	> Motor is not running	<ul style="list-style-type: none"> <li>• Motor overheated – let the SOLAR BOOSTER cool down and retry. Check pressure and clean nozzle if too high.</li> <li>• Cooling of motor damaged – call Nilfisk-ALTO service.</li> <li>• Other motor problems – call Nilfisk-ALTO service.</li> </ul>
<b>Burner failure – press heat ON/OFF button and hold for 2 sec.</b> <b>E9</b>	> The gas burner has detected an error in the burner system: <ul style="list-style-type: none"> <li>• Lack of gas.</li> <li>• No ignition.</li> <li>• Other errors.</li> </ul>	<ul style="list-style-type: none"> <li>• Try restart of burner by pushing the “Heat ON/OFF” button for 2 sec. If burner restarts within 3 attempts, you can disregard the error and continue cleaning.</li> <li>• Otherwise call Nilfisk-ALTO service.</li> </ul>

# 8 Technical Data



SOLAR BOOSTER PROGRAM		SOLAR BOOSTER 5-45G	SOLAR BOOSTER 7-58G	SOLAR BOOSTER 7-58GH
Item Nr.		107370450	107370470	107370490
<b>Performance data :</b>				
Pump pressure	[bar]	150	170	150
Qtec	[l/h]	900	1110	1030
Cleaning Impact	[kg-force]	4.5	5.8	5.2
Δ temp - (Full flow)	[°C]	78	78	43
Heating power	[kW]	93	100	60
Efficiency	[%]	95.5	94.1	91
Weight (empty)	[kg]	186	214	218
Max. sound power level	[dB(A)]	92	93	93
<b>Motor / Pump :</b>				
Nozzle type		550	680	640
Qmax	[l/h]	1020	1200	1100
Pump type		NA5	C3	C3
Motor output power	[kW]	5.5	6.5	5.5
Motor / pump	[rpm]	1450	1450	1450
Pump drive		Direct	Direct	Direct
<b>Connection requirements :</b>				
Voltage	[V]	400	400	400
Current - Max. consumption	[amp]	14/~3	15/~3	12.8 / 3~
Power consump. (heating+motor)	[kW]	1.4 + 6.1	1.4 + 6.9	0.1 + 6.9
Frequency	[Hz]	50	50	50
Min. inlet water pressure (full flow)	[bar]	1.0	1.0	1.0
<b>Heating :</b>				
Boiler type		EcoPower 7	EcoPower 7	Water tank
Max. inlet temperature	[°C]	30	30	85
Max. outlet temperature	[°C]	99	99	85
Burner fuel type		Natural gas LPG	Natural gas / LPG	Natural gas / LPG
Fuel consumption @ΔT=45°C <sub>HHV</sub> = 11 kW/m <sup>3</sup>	[m <sup>3</sup> /h]	4.5	5.6	5.7
<b>Available options :</b>				
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 are not covered by the guarantee).
- that repairs have not been carried out or attempted by other than Nilfisk-ALTO-trained service staff.

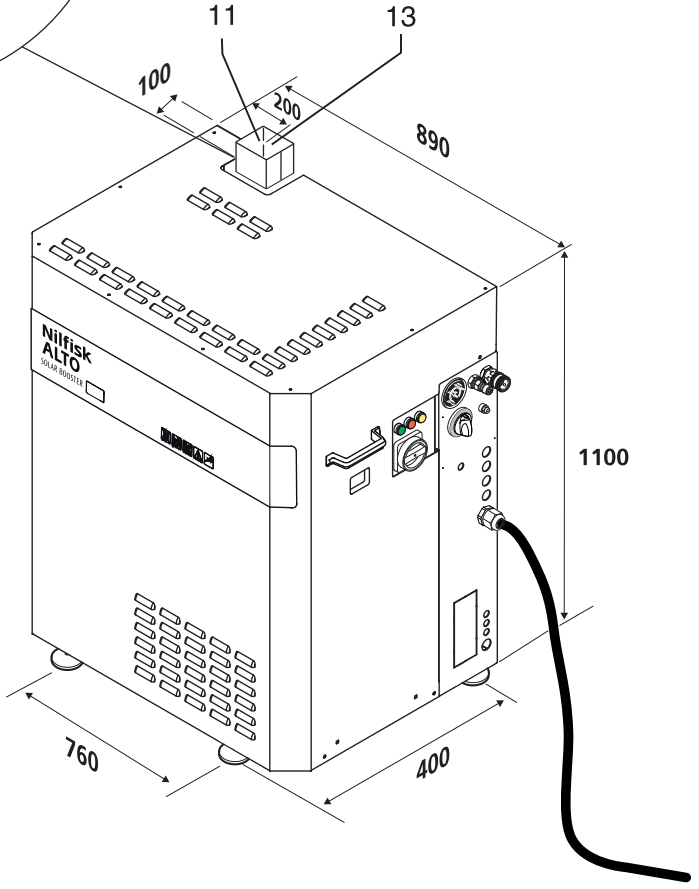
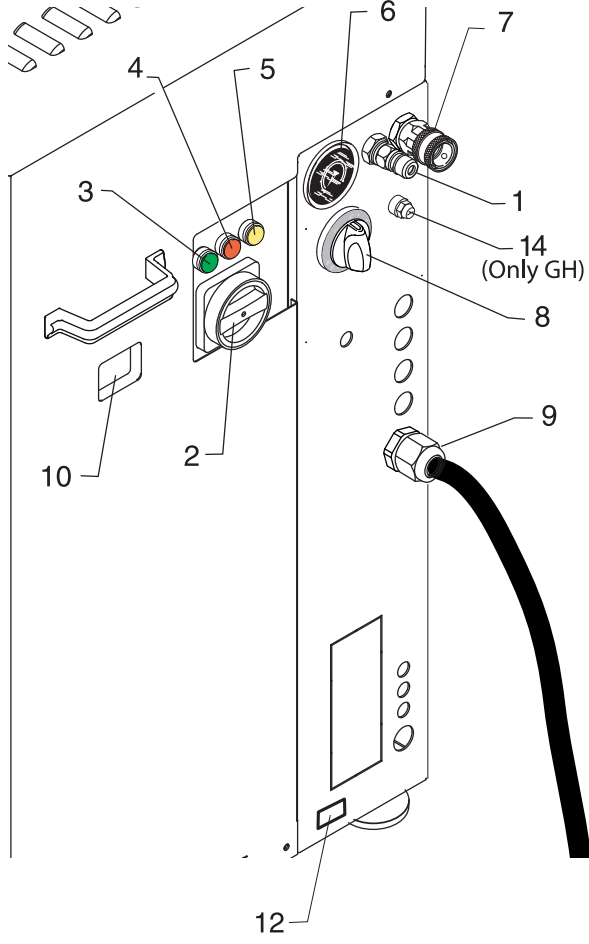
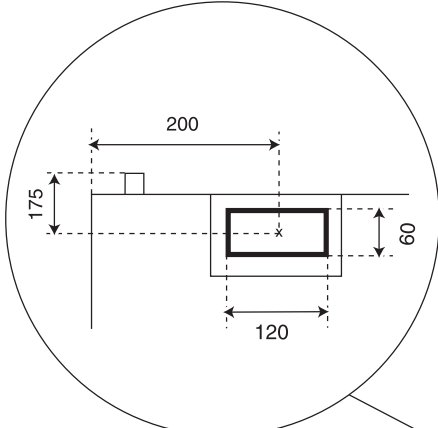
- that only original accessories have been applied.
- that the product has not been exposed to abuse such as knocks, bumps or frost.
- that the instructions in the manual have been carefully observed.

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

 <h2 style="margin: 0;">Declaration of Conformity</h2>
<p>The undersigned, representing the following manufacturer,                  Nilfisk-ALTO, Division of Nilfisk Advance A/S, Industrivej 1, DK-9560 Hadsund                  declares that the product:</p>
<p>T ype : SOLAR BOOSTER</p>
<p>is in conformity with the provisions of the following EC directives, with subsequent amendments:</p>
<p>2006/42/EC, 2006/95/EC, 2004/108/EC</p>
<p>and furthermore declares that the following harmonised standards have been applied:</p>
<p>EN 60335-2-79 (2006), EN 55014-1 (2006), EN 55014-2 (2001), EN 61000-3-2 (2006)</p>
<p>The following (parts/clauses of) national technical standards and specifications have been used:</p>
<p>DS EN 60335-2-79</p>
<p>Hadsund, 2008-11-01</p>  <p>Anton Sørensen                  General Manager of Technical Operations EAPC</p>



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