

02V/VA

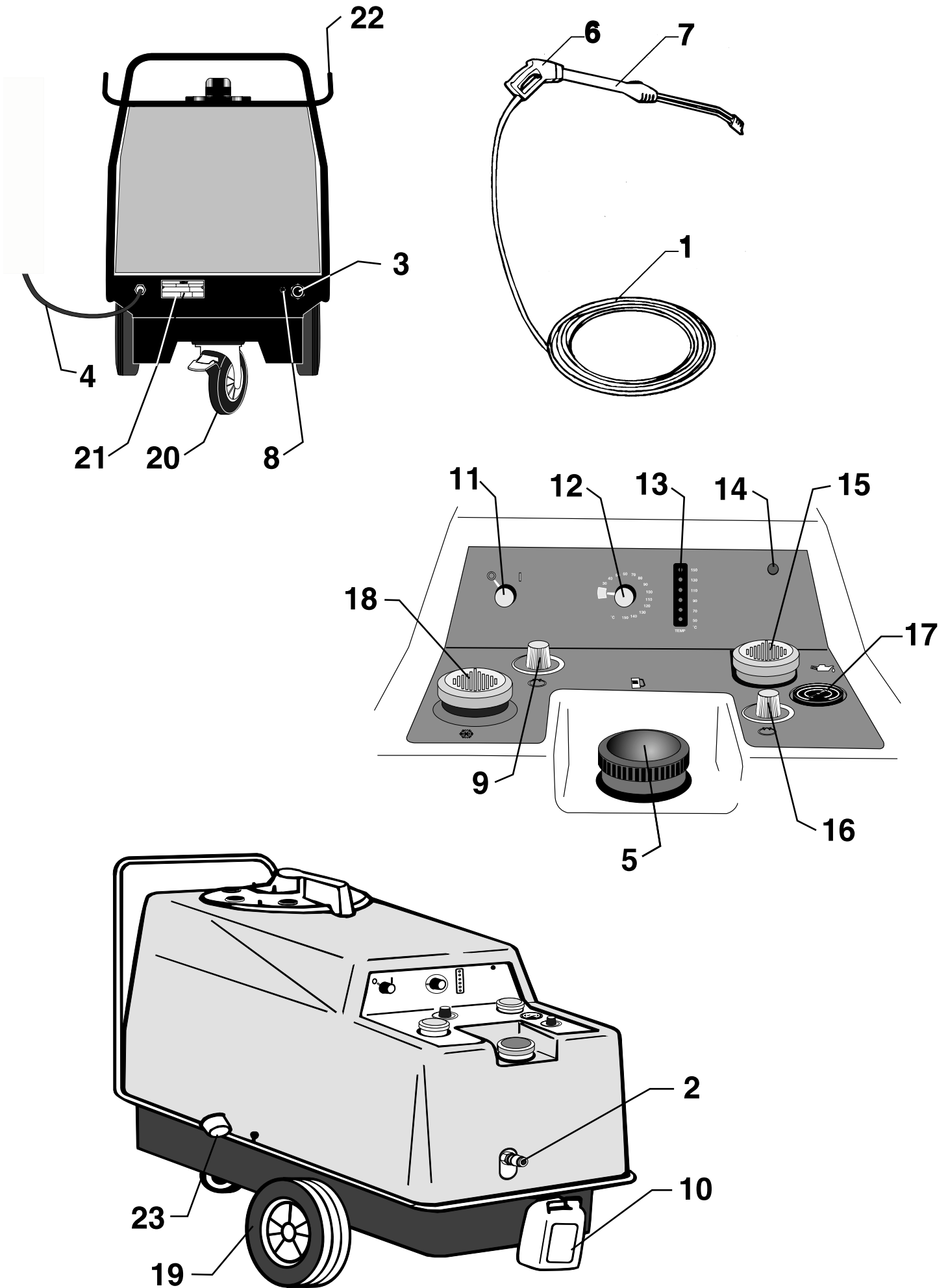


ALTO[®]
Total Cleaning
Confidence[™]

Ⓞ Instruction manual

TECHNOLOGY

Ersatzteile unter www.gluesing.net



IMPORTANT: Read this instruction manual before you start up your high pressure washer for the first time.

This machine is a hot water high pressure washer producing a water jet under high pressure and of a high temperature which is why severe injury and scalding can occur if the safety precautions are not observed. Therefore a complete understanding of the contents of this instruction manual is required in order to prevent injury to yourself, objects and persons nearby, and the machine itself.

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Designations

GB

(see drawings inside back cover)

1. Hot water high pressure hose
2. Connection for high pressure hose
3. Water connection (water inlet filter)
4. Electric cable
5. Fuel filling
6. Spray handle
7. Spray lance
8. Suction hose for detergents
9. Control knob for dosing of detergents
10. „ALTO No Scale“*
11. Start/stop button
12. Temperature control
13. Temperature display
14. Test lamp for direction of rotation of motor
15. Control of pump oil and filling
16. Valve for regulation of water volume
17. Pressure gauge
18. Filler neck for antifreeze
19. Driving wheel
20. Castor wheel with brake
21. Model tag
22. Winder for hose/cable
23. Support for spray lance

* anti-incrustant

ALTO environmental policy

ALTO has a strong commitment to and constantly works towards a cleaner and improved world. ALTO's environmental concern has led to several awards in recognition of our contribution to an improved environment. We constantly review all aspects of our business from production facilities, to our products and their packaging.

ALTO:

- Reuses all water which is used in product testing.
- Ensures every plastic component is recyclable.
- Produces packaging using wherever possible recyclable cardboard.
- Manufactures only biodegradable detergents.

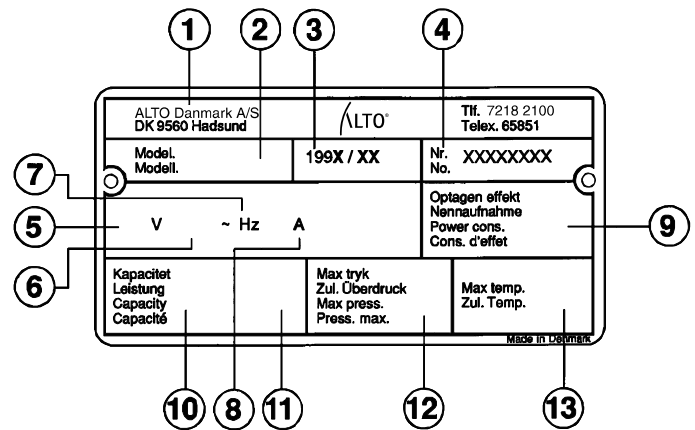
1.0 Survey of models

1.1 Model tag

This ALTO hot water cleaner has the model designation **02V/VA**.

The model designation appears from the text on the cabinet and the model tag at the back of the machine. The tag provides the following details:

1. Manufacturer
2. Model
3. Production year/week
4. Serial number
5. Mains voltage
6. Coupling
7. Mains frequency
8. Power consumption
9. Power absorption



10. Pump pressure
11. Capacity, water volume
12. Max. pressure
13. Max. temperature, outlet

1.2 Technical data

Model	1502V/VA	
Pump pressure	bar	90
Water volume ¹⁾ , min/max pressure	l/min.	6/11
Max temp., inlet water	°C	35
Water temperature, adjustable	°C	30 - 150 ²⁾
Fuel consumption at $\Delta t = 60^\circ\text{C}$	l/h	4.6
Fuel tank, contents	l	30
Spray lance:		
Spray angle h.p./l.p	degrees	15/65
Nozzle type		055 - red
Thrust, max	N/kp	19/1.9

Sound pressure level L_{pA} measured in accordance with ISO 11202 [DISTANCE 1m] [FULL LOAD]: 81 dB(A).

1) Full water volume = valve for regulation of water volume closed. (Fully reduced water volume = 8 l/min)

2) Steam at 150°C is reached at reduced water volume.

VA models feature an automatic start function and softening equipment.

Data at 12°C inlet water. We reserve the right to make alterations.

2.0 Instructions for use Safety precautions and warnings

Before starting up your high pressure washer for the first time, you must read through the following sections: *2.0 Instructions for use* and *3.0 Operating instructions* and follow all instructions to ensure the protection of user, surroundings and machine.

2.1 Starting-up

Upon the unpacking of your machine please check for any defects. If you find any, we kindly ask you to contact your ALTO distributor.

Check the electric cable

The insulation of the electric cable should be in a safe condition.

Please contact a qualified electrician or the nearest ALTO distributor if any doubts arise.

Check the voltage

Check that the voltage stated on the model tag corresponds to your mains voltage.

Power consumption, fuse

Check the power consumption stated on the model tag and then check correct prefuse.



Mains power connection

Faulty connection of the machine can cause electric shock.

- Only connect the machine to an installation with an earth connection.
- If you are in doubt about the earth connection, please contact a qualified electrician for correct installation.
- We 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 30 milli seconds.
- The electric supply connection shall be made by an qualified electrician and comply with the latest edition of the IEC Wiring Regulations.

Extension cable

If you want a wider radius of action ALTO highly recommend you to use an extension hose instead of an extension cable. If you still want to apply an extension cable when operating a three-phase high pressure washer, we recommend you to use the cable dimensions mentioned below: *(The use of the stated cable dimensions requires a stable mains voltage corresponding to the voltage stated on the model tag).*

l m	0<l<10 Amp	10<l<16 Amp	16<l<25 Amp	25<l<32 Amp
	mm ²	mm ²	mm ²	mm ²
0-50	1,5	1,5	2,5	4,0
51-75	1,5	2,5	2,5	4,0
76-100	1,5	2,5	4,0	6,0



NOTE: If an extension cable is required it *must* be earthed and connected through the plug to the earth cable of your supply network in accordance with prescribed safety regulations.

- Extension cable, plug and socket should be waterproof.
- Always use a cable similar to the one mounted on the machine i.e. with earth connection and for outdoor use. If you are in doubt, please contact a qualified electrician or the nearest ALTO distributor.
- Cable connections should be kept dry and off the ground.
- Check extension cables before usage. Don't use damaged cables.

2.2 Operation

This machine produces a high pressure jet of a high temperature and operation contrary to the instructions can cause severe injury!

For your own and the safety of others the following precautions should always be observed:

- **WARNING!** Never direct the water jet towards people, pets, electric wiring, or the machine itself.
- **WARNING!** Never try to clean clothes or footwear on yourself or other persons.
- We recommend you to wear goggles during operation.
- Never work barefoot or wearing sandals.



Safety precautions and warnings

- **WARNING!** Operator and anyone in immediate vicinity of the site of cleaning should take action to protect themselves from being struck by debris dislodged during operation.
- According to regulations persons under the age of 18 must not operate cleaning machines with a working pressure above 70 bar (applies to this machine).
- The machine should be placed as far away from the cleaning site as possible.
- Only let instructed personnel operate the machine.
- Don't start the machine until the high pressure hose has been correctly mounted.
- Spray handle and lance are affected by a backward force (thrust) during operation - therefore always hold the spray lance firmly with both hands.
- At intervals the machine should be stopped and the spray handle secured against inadvertent use by locking the trigger with the locking device.
- Only activate the trigger by hand. Never tie it up or fix it in any other way.
- Avoid damage to the high pressure hose such as running over by a car, squeezing, pulling, knotting/kinking etc. and keep it away from oil and sharp or hot objects, as such may cause the hose to burst.
- Never dismount the high pressure hose when the water temperature is above 50°C (risk of scalding) or while the machine is in operation. Disconnect the cleaner and the water connection before dismantling the high pressure hose.
- Never jerk the cable to disconnect the plug from socket.
- Always disconnect the plug from socket prior to disconnecting any extension cables.
- Avoid damage to the electric cables such as running over by a car, squeezing, pulling, knotting etc. and keep away from sharp or hot objects.
- *Never* use the machine in an environment where there could be a danger of explosion.
- **WARNING!** High pressure hoses, nozzles and connections are important for safety when operating the machine. Only use the high pressure steam hoses (with an imprinted max temperature of **150°C**), nozzles and connections prescribed by ALTO.
- For safety reasons only use original ALTO accessories and spare parts.
- In icy conditions never start the cleaner until machine, hoses and accessories have thawed. Otherwise the machine could be damaged.
- The cleaner should not be covered during operation.
- The flue gases of the boiler are hazardous to health. Always secure correct and adequate exhaustion during indoor operation.
- **WARNING!** Use of a wrong fuel can be hazardous!



DANGER OF FIRE

- * Always place the machine at a distance of at least 1 m from buildings or equipment during operation.
- * Never place inflammable products such as petrol etc. close to the machine during operation.
- * Never place the machine in the immediate vicinity of sources of heat (gas burners, heaters etc.).

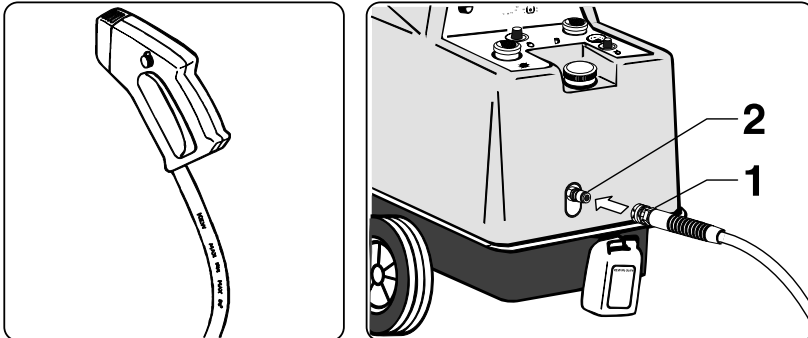
2.3 General

- It is not allowed to clean asbestos-containing surfaces with high pressure, unless using special equipment.
- Persons under the influence of alcohol, drugs and medicine should not operate the machine.
- Never touch plug and socket with wet hands.
- **WARNING!** This machine has been constructed for use with ALTO detergents with a pH value between 5.5 and 8.5). The use of other detergents or chemicals may cause problems as to the operation and the safety.
- When using detergents the enclosed instructions should always be strictly observed.
- Always unplug when cleaning and maintaining the machine.
- Don't use the machine if the electric cable or important parts of the equipment are damaged - i.e. safety devices, high pressure hoses, spray handles, cabinet.

3.0 Operating instructions

3.1 Connections

3.1-1 High pressure hose

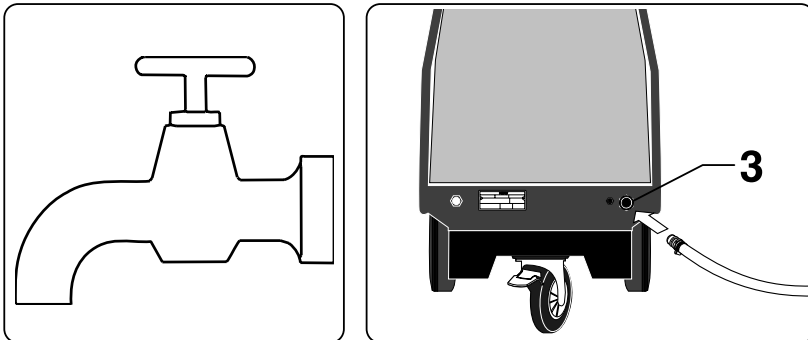


Only use ALTO high pressure steam hoses with an imprinted max temperature of 150°C.

Max length of extension hose: 50 m.

The high pressure hose (1) with imprinted max working pressure and temperature (150°C) should be attached to outlet socket (2) by quick coupling.

3.1-2 Water connection



Min length of hose: 6 m. 3/4".

Clean water inlet filter (3) at monthly intervals.

Max water pressure 10 bar.

The water supply system must supply the water volume stated in section "1.2 Technical data".

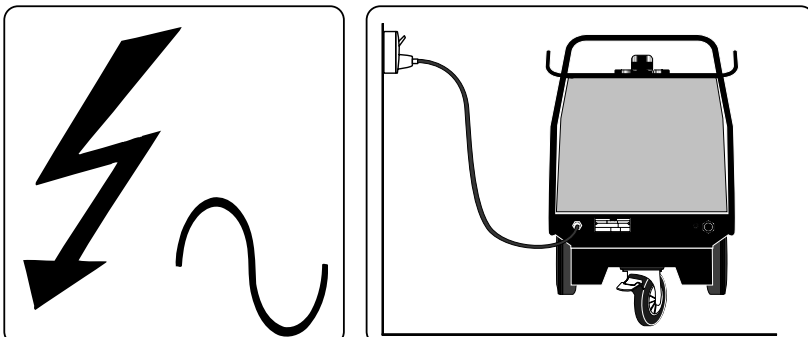
Let water run through the inlet hose to remove any impurities.

Attach the water inlet hose to the water connection (3).

If there is a risk of impurities (i.e. running sand) in the inlet water, an external water filter should be mounted beyond the internal filter. Please contact your ALTO distributor for further information.

NOTE: Connection to the public mains according to regulations.

3.1-3 Mains power connection



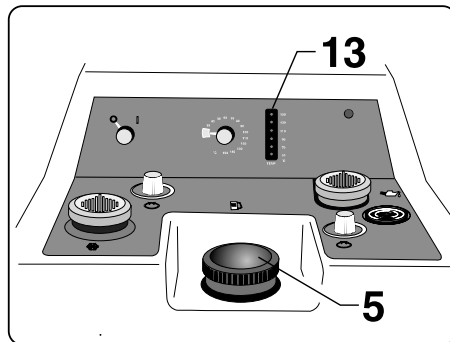
Only connect to an approved socket with earth connection.

Check voltage, fuse, cables and extension cables according to section "2.1. Starting-up".

In countries where many different types of plugs are applied, the machine is delivered with an electric cable without plug. The plug should be mounted by a qualified electrician.

NOTE: The red lamp (14) on the control panel must not flash when the circuit for the machine is closed. If the light turns on, don't start the machine as the direction of rotation of the motor will be wrong, see section "3.2 Starting-up procedure" and "7.0 Trouble shooting chart".

3.1-4 Fuel filling



Only use heating oil or diesel oil.

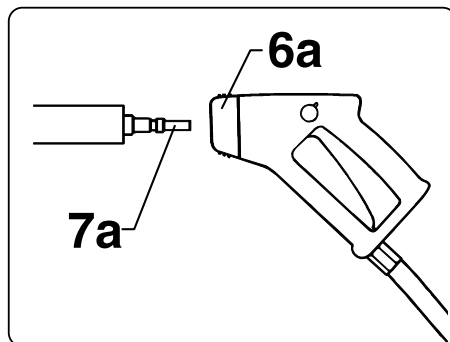
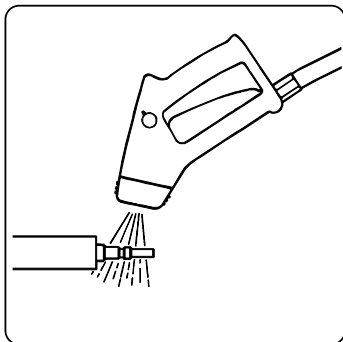
WARNING! Use of a wrong fuel can be hazardous!

Capacity of tank: 30 l.

Filling of fuel for the boiler through the filler socket (5). Capacity of tank: 30 l. Only use heating oil or diesel oil. If there is no fuel in the tank all six indicator lamps in the temperature display (13) on the control panel will flash.

The fuel supply for the boiler will automatically stop before the fuel tank runs dry.

3.1-5 Spray handle - accessories



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

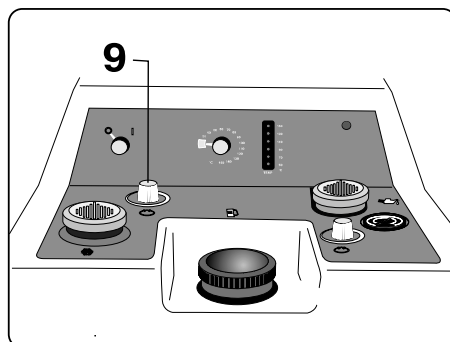
Pull forward the grey quick coupling trigger of the spray handle (6a).

Insert the nipple of the spray lance (7a) in the quick coupling and release the trigger.

Pull forward the spray lance or any other accessory to ensure correct mounting before starting the cleaner.

Max thrust of spray handle and lance - see section "1.2 Technical data".

3.1-6 Detergents - dosing unit



Only use ALTO detergents.

Use of aggressive detergents may damage equipment and affect the environment; pH 5.5 - 8.5.

Always use the suction filter.

Flush with water after use.

Only use detergents or chemicals with a pH value between 5.5 and 8.5.

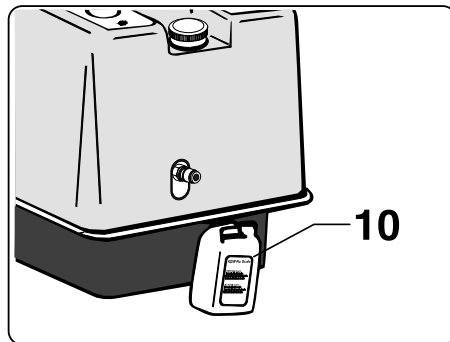
Detergents can be added to the water through the built-in dosing system under high as well as low pressure. Lower the suction hose with suction filter (8) into the container with detergent*) and adjust the control knob (9) to the required percentual dosage (0 - 8%) of the detergent. When the container is empty or when you do not apply the detergent, turn off the supply by turning the control knob to position 0.

Upon application of the detergent, the system should be flushed through with pure water for approximately 1 min at 8% dosage, upon which the control knob is closed.

*) Holder for container: Contact your ALTO distributor for further information.

3.1-7 Anti-incrustation - ALTO No Scale

>> No Scale <<

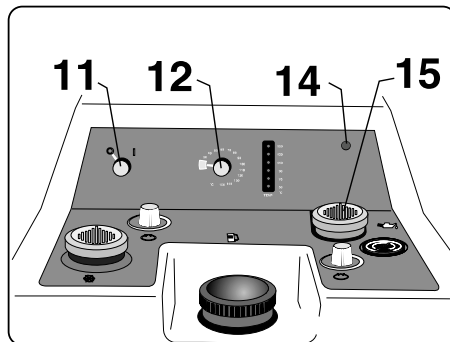
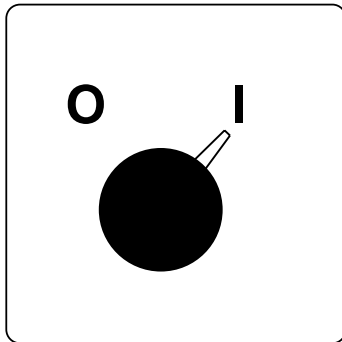


Standard equipment on VA models

Only use "ALTO No Scale".

VA models feature a "softening equipment". To avoid incrustation of the piping of the boiler and thus ensure optimum operation, an anti-incrustant - "ALTO No Scale" should be added (available from your ALTO distributor). The "No Scale" container (10) is positioned at the front of the machine and the anti-incrustant will automatically be added to the water in the float chamber in a balanced dosage. The automatic softening equipment can be mounted on the V models. Contact your ALTO distributor for further information.

3.2 Starting-up procedure



Check oil

Turn the thermostat to the BLUE field.

Turn to position I for start.

Check that the oil in the oil reservoir (15) is between the MIN and the MAX markings.

Turn the temperature control (12) to the blue field. Make sure that the high pressure hose has been correctly mounted.

Turn the start/stop switch (11) to pos. I. Upon the starting-up procedure the machine is immediately ready for operation with cold water.

NOTE: Machines with automatic start /stop - Model VA

Don't start the machine until the high pressure hose has been correctly mounted.

When the machine is in operation and the spray handle inactivated, the machine will stop after approx. 40 seconds. The machine can be restarted by activating the spray handle.

NOTE: Machines without automatic start - Model V

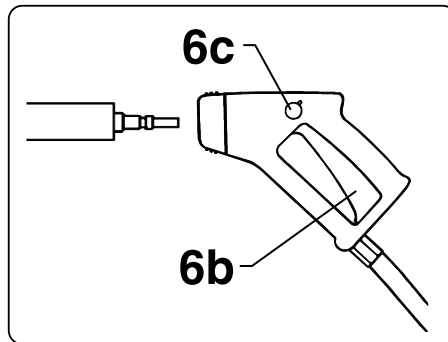
When the machine is in operation and the spray handle inactivated, the machine will stop after approx. 11 minutes. The machine can be restarted by turning the start/stop button (11) back to position O and then to position I.

Direction of rotation of the motor

The red lamp (14) on the control panel must not be on when the circuit for the machine is closed. If the lamp is alight, don't start the machine as the direction of rotation of the motor will be wrong. If the direction of rotation of the motor is wrong there is no air supply for the boiler and serious malfunctions will occur if the machine is used.

To correct this fault, please see section "7.0 Trouble shooting chart".

3.3 Operation



*Always hold the spray lance with both hands!
Always lock the spray handle when the cleaner is not in operation.*

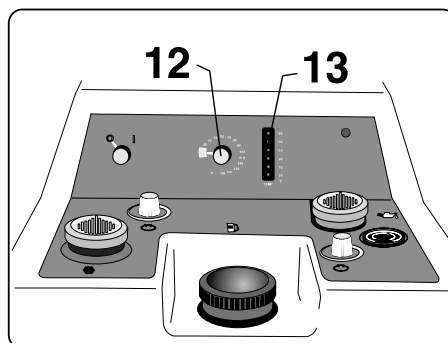
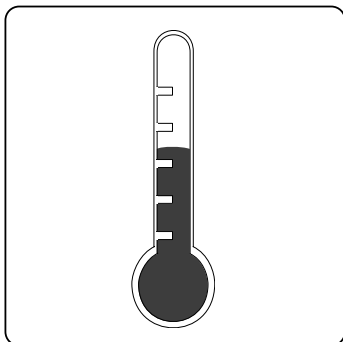
Activate the high pressure washer by releasing the trigger of the spray handle (6b). When starting up the machine the pressure may be unsteady because of air in the pump system. After a short time the air will escape from the system and the pressure will become steady.

When the cleaner is not in use, secure the spray handle by turning the safety knob (6c) into pos. 0.

NOTE: Machines without automatic start - Model V

Although the machine features an automatic stop function, it would be a good idea to make a habit of stopping the machine if it is not used for a period of more than 5 minutes. Thus you will avoid unnecessary power consumption and unnecessary wear of the motor pump unit.

3.4 Temperature control



<i>Cold water mode</i>	<i>0 - 50°C</i>
<i>Hot water mode</i>	<i>50 - 95°C</i>
<i>Steam mode</i>	<i>95 - 150°C</i>

Adjust the temperature control (12) to the required temperature.

Indicator lamps on the temperature display (13) show the actual temperature of the outlet water.

Cold water mode: Upon the starting-up procedure the machine is immediately ready for cleaning with cold water.

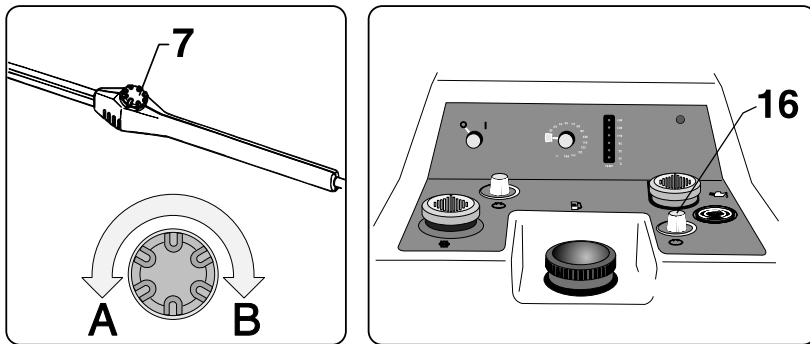
Hot water mode: Adjust the temperature control (12) to the required temperature, 30-95°C.

Steam mode: Screw the valve for regulation of the water volume (16) home (clockwise), and adjust the temperature control (12) to the required temperature, 95-150°C.

Note: The max temperature of 150°C can only be reached with the reduction valve (7) of the spray lance adjusted to high pressure (turn clockwise until stop).

IMPORTANT: When adjusting to temperatures above 95°C *the valve for regulation of the water volume (16) must be screwed completely home* (clockwise) upon which the temperature control (12) can be adjusted to the required temperature, 95 - 150°C.

3.5 Spray lance, regulation of pressure and water volume



Turn pressure reducing valve:

Clockwise (B): high pressure

Counter clockwise (A): low pressure

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

High pressure operation

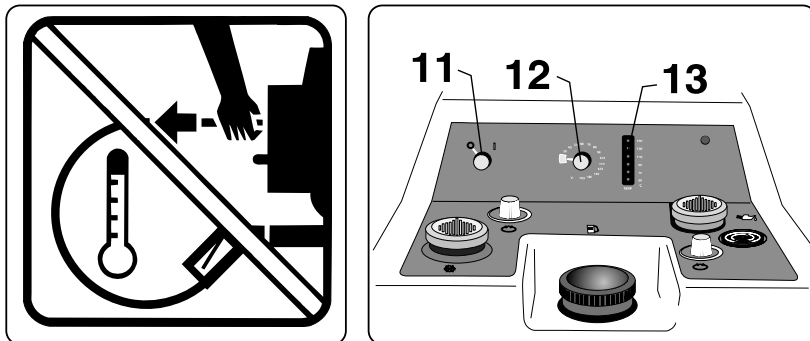
The max working pressure of the machine is reached when the pressure reducing valve (7) is completely closed (B) and the valve for regulation of the water volume (16) is quite open (turned in the direction of the arrow). In this position only the high pressure nozzle is used - high pressure mode. The water volume is infinitely variable between min and max output.

When the spray handle is inactivated, screw the valve for regulation of the water volume (16) home (in the opposite direction of the arrow). This corresponds to a working pressure of 30 bar and a water volume of approximately 8 l/min. If you want to increase the water volume, turn the valve in the direction of the arrow until the required volume has been reached. 1 turn gives an increase of approx. 40 bar pressure.

Low pressure operation

If a completely reduced pressure is required, open the reduction valve (A) completely. The nozzle pressure will then be approx. 5 bar. In this position both spray lances are used - low pressure mode.

3.6 Stop - dismantling of high pressure hose



Danger of scalding!

Never dismantle the high pressure hose when the water temperature is above 50°C.

If the machine is set aside immediately after hot water or steam operation, it should be cooled down in "cold water mode" at first until the temperature is below 50°C.

Turn the temperature control (12) to the blue field for cold water and activate the spray handle until the temperature (13) is below 50°C.

Then turn off the water supply and stop the machine by turning the start/stop button (11) to position O. Now the high pressure hose can be dismantled.

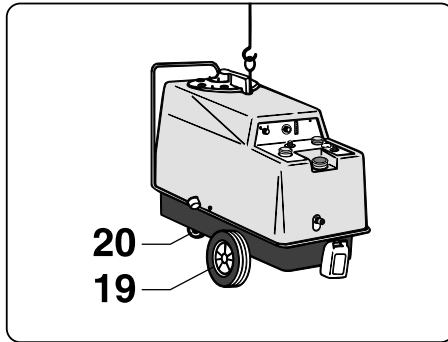
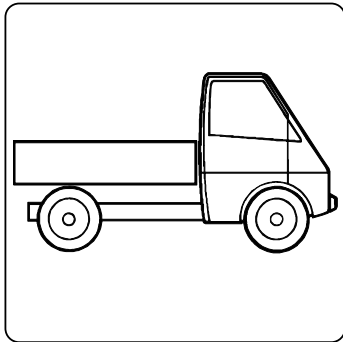
NOTE: Machines with automatic start/stop - Model VA

When the machine is in operation and the spray handle inactivated, it will stop after approximately 40 sec. The machine can be restarted by activating the spray handle.

NOTE: Machines without automatic start - Model V

When the machine is in operation and the spray handle inactivated, it will stop after approximately 11 minutes. The machine can be restarted by turning the start/stop button (11) back to position O and then to position I.

3.7 Transport directions

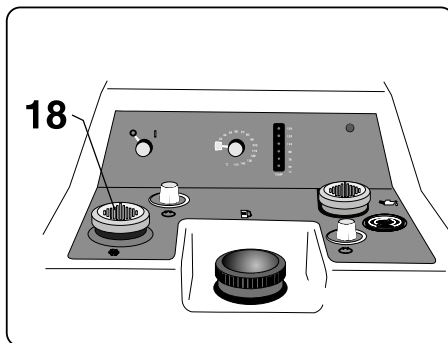
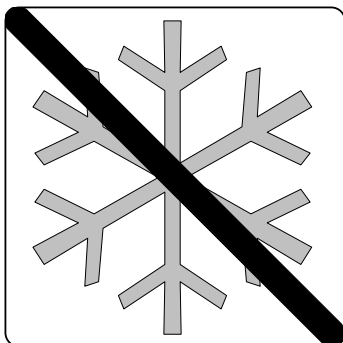


For lifting by crane, use lifting straps!

When lifting the machine by forklift truck, place a fork on each side of the driving wheels (19). One of the forks should be placed as close to the castor wheel (20) as possible. When lifting by crane a lifting strap should be used, which is available as an accessory.

Always fasten the machine securely during transport. The brake of the castor wheel (20) should be applied during transport.

3.8 Storage - frost protection



Frost-free room or antifreeze!

We recommend you to store the machine in a frost-free room between the cleaning tasks. The machine *must* be emptied of water prior to storing for a longer period. This is done in the following way:

1. Detach water hose. Dismount spray lance and empty it of water.
2. Start the machine, and let it run with activated spray handle until all water has run out. Then empty the coil by unscrewing the drain plug (25).

FROST PROTECTION

If the store room is not frost-free, the machine should be protected with an antifreeze. The frost protection is reached by following the two points above, screwing the drain plug in again and then do the following:

3. Remove the lid from the filler neck for antifreeze (18) and slowly fill in approx. 8 l antifreeze while the machine is running.
4. Place the spray handle (without spray lance) above the filler neck and activate the spray handle to let the antifreeze circulate. Activate the spray handle 2-3 times and open and close the valve for regulation of the water volume some times.
5. Finally the antifreeze is led back to the pump again.
NB! After repeated use the antifreeze will be diluted with water and thus lose its antifreeze effect.

4.0 Fields of application and working methods

4.1 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, engine rooms, etc.
Building and construction	Building renovation, cleaning/degreasing of vehicles, equipment, buildings, etc.
Industry	Degreasing and cleaning of machines, workpieces, and vehicles.
Service	Cleaning of vehicles and degreasing tasks.

4.2 Working pressure

The high pressure washer may be used with high or low pressure at your own option. At the standard spray lance the working pressure is adjusted by turning the reduction valve.

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

4.3 Detergents

The most efficient cleaning is obtained when using detergents in conjunction with high pressure cleaning. For that purpose ALTO can offer you a series of products specially developed for high pressure cleaning, e.g.:

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

Disinfection
Maintenance of the high pressure washer

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

Contact your 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 on the product labels or the data sheet. The dosage is adjusted on the dosing unit of the high pressure washer.

Only use detergents or chemicals with a pH value between 5.5 and 8.5.

4.4 Dosing of detergents

The high pressure washer features a built-in injector enabling dosing of a detergent to the water when the cleaner operates in low as well as in high pressure mode. With this dosing unit it is possible to vary the dosing of detergent infinitely between 0 - 8%, and thus most cleaning jobs will be covered (also see section 3.1-6).

For foam cleaning mount the special foam injector between the high pressure washer and the high pressure hose. Insert the suction hose of the injector into the foam detergent. Attach the foam lance to the spray handle and now foam can be applied. Upon application *detach the foam injector* and replace the foam lance by a spray lance, upon which cleaning can begin.

4.5 Working methods

Your high pressure washer has been developed for cleaning according to the so-called "2-step method".

STEP 1	Application of detergent
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 out, and the adjustment is made on the control knob at the control panel.
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, 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 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.

For certain cleaning tasks it may be an advantage to apply detergents for high pressure operation - i.e. for the dewaxing of cars.

5.0 Functional description

5.1 General description

The water passes from the quick coupling (A) through a water filter (V) to the float chamber (B), from which it leads into the high pressure pump (C). The high pressured water leads through the discharge system of the pump where the safety and circulation valve (D) is situated. Then it passes the flow switches (F-G) and enters the boiler (I). Here the water is heated to the required temperature. After the boiler the hot high pressured water passes the temperature sensor (P), on to the spray handle (Ø) and the spray lance (K). The fuel is drawn from the fuel tank (N) through the filling strainer (Z) by the fuel pump. Now the pump leads fuel to the nozzle (H) where it is ignited.

For cleaners with automatic start/stop - VA models. On the pressure side the high pressure pump (C) features a flow switch (F) with an alarm lead which is activated when there is a water flow in the spray handle / lance. A timer function picks up the signals of the flow switch and registers them as either start or stop signals, and thus the machine is automatically either started or stopped. As soon as there is no more water passing through the spray handle / lance, the machine stops automatically after approx. 40 seconds.

5.2 High pressure pump

On the pressure side the high pressure pump features a circulation valve (D). 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 circulation valve also functions as a safety valve and has been adjusted to open approx. 30 bar above the working pressure. The valve has been adjusted and sealed from the factory. ***This adjustment must not be changed!*** When the machine stops it is automatically devoid of pressure.

5.3 Motor

The motor is protected against overloading as a thermal cut-out has been built into the stator windings. If the motor is overloaded or if the cooling system for the motor is interrupted, the thermal cut-out will cut off the power to stop the machine. Then it cannot be restarted on the control panel until the motor has cooled. (See section 7.0 Trouble shooting chart). If the power fails, the machine must be restarted.

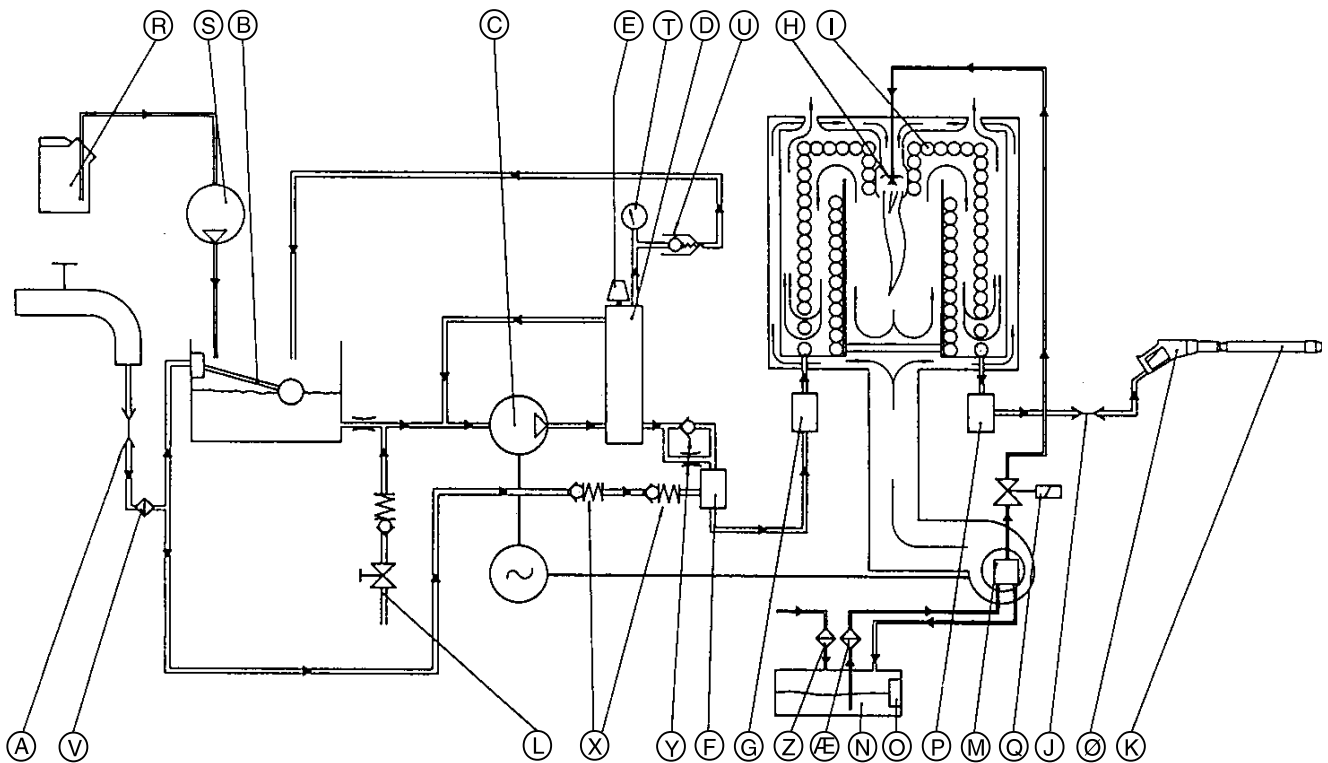
5.4 Burner system - control system

The burner system is surveyed and controlled by an electronic control unit. The operational conditions of the incorporated components of the burner system are surveyed by some safety circuits and sensors. In conjunction with the control unit the sensors ensure a correct function of the machine and they ensure that the machine is stopped in the event of malfunctions.

The water temperature is controlled by the temperature sensor (P), which regulates the fuel supply for the burner through the solenoid valve (Q). As the burner is only allowed to operate when there is a water flow in the system (i.e. when the spray handle is activated) the machine features two flow controls (F-G) which control the fuel supply through the electronic control unit. When the flow in the system is interrupted, the flow switches are activated and the fuel supply will stop. When the water flow repeats the flow switches are reactivated and reallow the fuel supply. Safety circuits in the electronic control unit survey that both flow switches are activated. Thus the fuel supply is interrupted when only one of the flow switches are activated. When the water flow is repeated the control unit only allows the fuel supply if both flow switches have been activated. As the fuel pump is not allowed to run without fuel, a level switch (O) has been incorporated in the fuel tank. This level switch interrupts the fuel supply for the burner before the tank runs dry of fuel.

NB! Changes of the electrical coupling of the machine are not allowed.

Functional diagram



- | | |
|------------------------------|----------------------------------|
| A Quick coupling, inlet | O Level switch |
| B Float chamber | P Temperature sensor |
| C High pressure pump | Q Oil solenoid valve |
| D Circulation valve | R "No Scale" container *) |
| E Regulation of water volume | S "No Scale" pump *) |
| F Flow switch | T Pressure gauge |
| G Flow switch | U Automatic ventilating valve *) |
| H Burner system - nozzle | V Water filter |
| I Boiler | X Non-return valve *) |
| J Quick coupling, outlet | Y Throttle / non-return valve |
| K Spray lance | Z Filling strainer |
| L Dosing unit for detergents | Æ Suction filter, fuel |
| M Fuel pump | Ø Spray handle |
| N Fuel tank | |

*) Only for **VA** models

The following sensors are built into the system:

- **Flow switches (F - G)**
Ensure that there is a water flow through the boiler, before it can be ignited. Allows the solenoid valve (Q) to open.
- **Flame sensor (light sensor)**
Surveys that there is a combustion in the boiler when fed with fuel, and that the combustion will stop when the fuel supply is cut off.
- **Temperature sensor (P)**
Measures the temperature of the high pressure water from the boiler. Dependent on higher or lower temperature the burner will ignite or turn out.
- **Level switch for tank (O)**
Switches off the combustion in the boiler before the tank runs completely dry preventing damage of oil pump.

6.0 Maintenance

6.1 General

To ensure that your ALTO high pressure washer is always in an operational condition it is advisable to have it checked by an ALTO service technician at regular intervals.

However, it applies to the most exposed components that a minimum of maintenance ensures a prolonged and problem-free operation. Therefore it will also be a good idea to make a habit of the following:

- Before mounting the water hose and the high pressure hose the quick couplings should be cleaned of dust and sand.
- Before mounting spray lance or any other accessory on the spray handle, the machine should be started and the quick coupling cleaned of dust and sand.
- In periods where detergents are not used the injector system should be flushed through with pure water to avoid drying up/clogging up of soap in the system.
- The water filter should be cleaned once a month or more frequently as the occasion requires.
- We recommend you to store the machine in a frost-free room. If by mistake the machine freezes up, it must not be started. Let machine, hoses and accessories thaw up before starting up.
If the room is not frost-free the machine should be protected with an antifreeze.
- Replace fuel filter (27) once the year or more frequently as the occasion requires.

6.2 Oil

The oil should be changed after each 1000 hours' use.

Remove the cover of the oil reservoir (15). Unscrew the drain plug (25). Allow the oil to run out and clean the drain plug of impurities. Screw in the plug and refill the pump with fresh oil through the oil reservoir.

Holds approx. 1 l.

From ALTO the pump is filled with zincless hydraulic oil - ALTO Pump Oil 100. When refilling and changing the oil this or an oil with the following specifications should be used:

ISO no 100

Viscosity index (VI) min 130

Pour point below -30°C

6.3 Sludge container

The used oil is caught in a sludge container (26). The container should be emptied before it is full; this oil must not be reused in the pump.

PROTECT THE ENVIRONMENT

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

6.4 Water filter

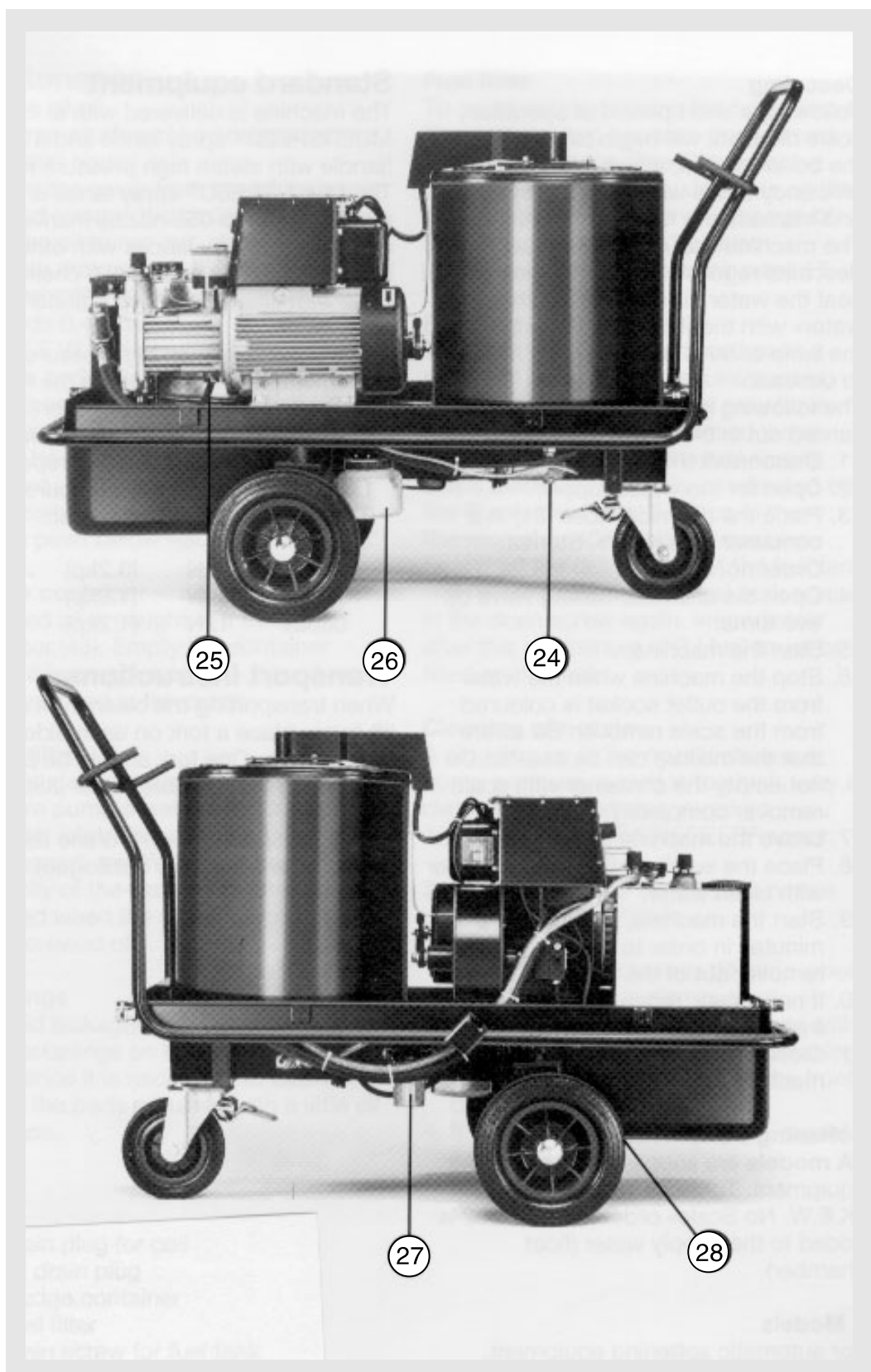
To avoid debris entering the high pressure pump, a water filter is fitted at the water inlet (3). Dependent on the purity of the water this filter will have to be cleaned once the month or more frequently as the occasion requires.

The filter can be removed when the quick coupling (3) has been unscrewed.

6.5 Fuel filter

A filter (27) between the fuel tank and the fuel pump prevents impurities from penetrating the fuel pump.

The filter unit should be changed dependent on the purity of the fuel. A yearly change of the filter is recommended.



- 24. Drain plug for coil
- 25. Oil drain plug
- 26. Sludge container
- 27. Fuel filter
- 28. Drain screw for fuel tank

6.6 Draining off the fuel tank

The fuel tank should be drained off once a month or as the occasion requires to remove any impurities and condensed water. The draining off is most expedient when the fuel tank is empty. This is indicated by six lamps in the temperature control (13) turning on. The machine is stopped. The drain screw from the fuel tank (28) is unscrewed. After having emptied the fuel tank the drain screw is screwed in again. Upon this you **must** immediately refill the tank with min 3 l fuel.

6.7 Descaling of coil

If your water supply is of a „soft“ or „medium hard“ quality, i.e. less than 15dH (German degree of hardness) a descaling may not be required. However, this only applies for machines with automatic softening equipment and on condition that the anti-incrustant „No Scale“ is always filled in. See section 3.1-7. If the hardness of the water is above 15dH, the machine should be descaled at least once the year or as the occasion requires. Scale deposits in the spray lance or reduced heat rating indicate that a descaling is required.

Descaling as follows:

1. Detach high pressure hose.
2. Turn on the inlet water.
3. Insert the suction hose for detergents (8) in a container with descaler, ALTO Stonex.
4. Adjust the control knob for dosing (9) to 8% (see section 3.1-6).
5. Start the machine in cold water mode.
6. Stop the machine when the water escaping the outlet socket has been coloured by the descaler.

Warning: The mixture may be caustic!

Do not on any occasion empty the container to prevent air getting into the system.

7. Let the machine rest for 5 - 10 minutes.
8. Place the suction hose (8) in a container with pure water.
9. Start the machine and let it run 5 - 10 minutes to have the descaler out of the system.
10. If required, repeat the procedure from item 3 - 9.
11. Close the dosing valve, and the machine is ready for operation.

Note! The descaling should always be carried through in accordance with the instructions on the descaler product.

6.8 Cleaning of high pressure nozzle

A clogging up in the nozzle causes a pump pressure which is too high and cleaning is immediately required.

1. Stop the cleaner and detach the spray lance.
2. Carefully clean the nozzle.
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.

7.0 Trouble shooting chart

You have chosen a quality product and therefore deserve the best service. To avoid unnecessary disappointments, you should check the following before contacting the nearest ALTO service organisation:

Fault	Cause	Correction
Machine will not start	A fuse has blown Power/plug not connected Defective extension cable Defective socket Thermal switches activated Pump frozen up	Change the fuse. Connect power/plug. Try without extension cable. Try another socket. Let the motor cool. Start the machine and check that the working pressure is not too high and that the mains voltage corresponds to the specifications. Let the pump thaw.
Machine stops shortly after starting	A fuse has blown Thermal switches activated Wrong fuel (ex: kerosene) Wrong mains voltage Extension cables not correctly dimensioned	Change the fuse. Let the motor cool. Then check that the pressure and the mains voltage correspond to the specifications. Change to correct fuel (see section 3.1-4) Check that the mains voltage corresponds to the data on the model tag (see section 1.1). Remove extension cable or use correct cable dimension (see section 2.1).
Fuses blow		Change to an installation corresponding to the ampere consumption of the machine at a minimum.
Working pressure too high	Nozzle partly clogged up	Clean the nozzle (see section 6.8)
Working pressure too low	Valve for regulation of water volume not adjusted to max water volume	Completely open the valve for regulation of water volume. Turn in the direction of the arrow.
Working pressure fluctuating	Air in the pump High pressure hoses too long Water supply too low Water inlet filter clogged up Scale deposits in coil	Repeat venting. Check that the dosing valve (9) is completely closed. Detach high pressure extension hoses and retry. Extension hose max 50 m. NB! Avoid long extension hoses with many connections. Detach the water inlet hose and check the water volume (see section 1.2). NB! Avoid long thin hoses (min 3/4"). Clean the filter (see section 6.4). Descale coil (see section 6.7).
No working pressure	Nozzle clogged up No inlet water Hoses / spray lance frozen up	Clean the nozzle (see section 6.8). Check the water connection. Let hoses / spray lance thaw.
Burner does not ignite (3 phase machines:)	Lack of fuel Fuel filter clogged up No flame Wrong direction of rotation	Refill with fuel. Change fuel filter. Change fuel filter (see section 6.5). Change two phase conductors in the plug. (Send for an electrician)
Insufficient heating	Scale deposits in coil	Descale coil (see section 6.7).

Should other malfunctions occur than those mentioned above, please contact the nearest ALTO service organisation.

Customer Services (UK only):

ALTO Cleaning Systems Ltd.
Gilwilly Industrial Estate
Penrith, Cumbria CA11 9BN

Phone: 01 768 868 995

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ALTO Danmark A/S
Industrikvarteret
DK-9560 Hadsund
Tel.: +45 7218 2100
www.alto-online.com

Ersatzteile unter www.gluesing.net