

HD 4000 C

1.509-035
1.509-515

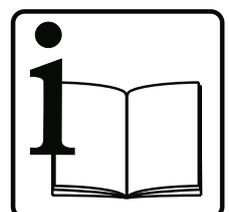
HD 6000 C

1.967-045

Operating Instructions



5.956-648
A 10369
(06/00)



Operating Instructions

Please read before operating the unit,
and keep in a safe place for future reference.

Proper disposal – for the sake of our environment

Packaging materials

The packaging components used to ship the unit are composed of wood and cardboard, i.e., environment-friendly materials, both of which can be easily sorted out and collected for recycling.

Important!

Waste oil may be disposed of only at designated collection points. Please take used oil to these special installations. Remember: It is an offence to contaminate the environment with waste oil!

Operating media

Engine oil

The equipment contains engine oil. Any waste oil collected during an oil change, as well as any oil-water mixture exiting from the machine in conjunction with a leak, must be collected and delivered to a waste-oil collection point.

Cleaning detergents

All Kärcher cleaning detergents, as indicated by the 'ASF' designation, are designed to be separator-friendly. This means that they do not impede the function of oil separators. A listing of the recommended cleaning detergents is featured in the "Accessories" section.

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1. System Operating Hazards

This system is equipped with an overpressure protection feature which was subjected to a safety inspection. Improper operation or abuse of this feature constitutes an hazard to health and life of the operator and/or third persons.

Any persons charged with the installation, commissioning, operation, maintenance or service of the machine are obligated:

- *to be appropriately qualified*
- *to diligently observe these Operating Instructions*

2. Safety Instructions and Information

Throughout the present Operating Instructions the following symbols are used:



Denotes an immediate and present danger. Failure to observe this notice could lead to severe injury or death.



Denotes a potentially hazardous situation. Failure to observe this notice could lead to minor injuries or property damage.



Denotes operating hints and important information.

3. Danger Sources

Sections of the water volume contained in the system are under high pressure. High-pressure water jets may exit from damaged system components, posing injury and/or scalding hazards.

General Hazard Overview



- *Injury hazard through exiting water jet of high-pressure or high-temperature water. Even after the Emergency-STOP master switch has been activated, the system contains high pressure. After a system stop, release remaining system pressure by opening a high-pressure gun.*
- *Burn injury hazard through hot system components. During hot-water operation, do not touch non-insulated pipe installations and hose couplings. Grasp the jet lance by the grip surfaces only.*
- *Injury hazard through flying debris. Flying debris or objects can cause injury to persons or animals. Never aim the water jet at fragile or loose objects.*
- *Explosion hazard. The use of this system in enclosed indoor areas is prohibited.*
- *Explosion hazard. Injury hazard arising from system damage. Beside water, no other liquid media may be used. This also precludes the introduction of flammable or corrosive liquids to the system.*
- *Health hazard through cleaning detergents. Due to the possible adding of detergents to the system water, the water exiting from the system must not be used as drinking water.*

Hazards posed by defective equipment



Danger!

Injury hazard through exiting water jet of high-pressure or high-temperature water. Before each system start, check high-pressure hose, tubing, valves and high-pressure lance for damages. Replace leaking components immediately, and correct any leaks in connections or couplings without delay.

Hazards during work on the system

Repair or service work may be carried out only by:

- manufacturer-approved customer service depots
- trained professional personnel



Danger!

- *Injury hazard through exiting water jet of high-pressure or high-temperature water. Release system pressure before performing work on system components. In the case of hot-water operation, allow unit to cool before commencing work.*
- *Electric shock hazard. Switch OFF and secure master switch before commencing work on the system.*

4. Hazards posed by Accessories

A sharp and powerful waterjet exits from the orifice of the spray lance nozzle. When operating the spray lance, keep in mind the following:



Danger!

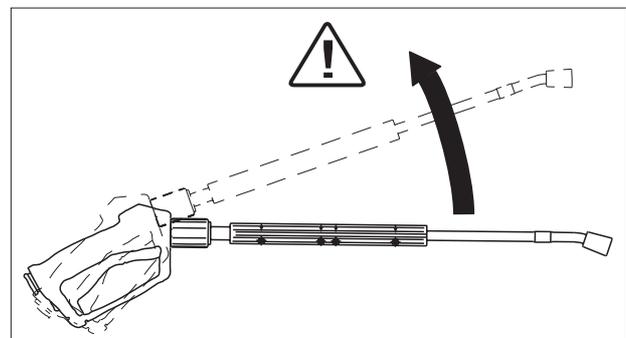
- *Deadly electrical shock hazard. Do not aim the waterjet at*
 - *electrical devices and systems*
 - *at any parts of the system proper**All live components within the working area must be spray-water protected.*



Danger!

- *Injury hazard. Hazard of chemical burns caused by cleaning detergents. Scalding hazard through hot water. Do not aim waterjet at persons or animals. Strictly observe safety instructions on detergent labels.*
- *Accident hazard due to hidden damage. Clean tires and valve stems from a minimum distance of 30 cm.*
- *Injury hazard through exiting water jet of high-pressure or high-temperature water. Only original Kärcher high-pressure hoses are optimised for the demanding use in the system. No warranty claims are accepted in the event that other types of hoses are used.*

The waterjet exiting from the spray lance causes a recoil force which is deflected upward by the downward angle of the spray lance nozzle.



- *Injury hazard through recoil action. The force of the recoil action may throw you off balance, and you may fall down. The spray lance may whip around and injure persons standing nearby. Select a secure foothold position and firmly grasp the handgun. Never wedge the handgun trigger in the open position.*
- *Injury hazard through defective hose coupling. Check hose coupling daily for tightness and absence of leakage.*

**Danger!**

- *Health hazard posed by toxic substances.*
Do not spray clean the following materials, because substances known to pose a risk to human health may be swirled up:
 - *Materials containing asbestos*
 - *Materials that could possibly contain toxic substances hazardous to human health.*
- *Poisoning hazard*
Chemical burn hazard
Fire hazard
Protect cleaning detergent storage against access by unauthorised persons.
Observe all safety instructions for cleaning detergents.

5. Noise Protection

The system generates a sound level of approximately 80 dB (A), with the use of sound dampening, this is reduced to 70 dB (A). Therefore, hearing protection at the **system installation site** is not mandatory.

However, at the **workplace proper**, (i.e., handgun) a noise hazard must be assumed to be present under normal circumstances (pursuant to Regulation VBG 87). Accordingly, suitable hearing protection must be worn while working in noise-polluted areas.

6. Work Stations

The operator's work station is located at the instrument panel. Dependent on the system configuration, additional work stations are constituted by the accessories (spraying devices) that are connected to the system taps.

7. Authorised Operators

The operation of the system is restricted to persons over the age of 18 who have been properly instructed. An exception is made with youths over age 16 who need to operate the system as part of their training, and if such use of the system is duly supervised (Regulation VBG 87).

Additional local ordinances must be observed.

The system operator is responsible for third persons within the working area.

The areas of responsibility covering the various operator functions on the machine must be precisely delineated and stringently observed.

Overlapping areas of competence present a safety risk.

The system owner is responsible for:

- making the Operating Instructions available to the system operator
- ensuring that the operator has read and understood the Operating Instructions

8. Personal Protective Equipment



When cleaning resonating components, hearing protection must be worn to prevent hearing loss.

- For protection against spray-water, water repellent protective clothing must be worn.

9. Safety Measures on the Installation Site

**Danger!**

Danger of Death posed by system components toppling or falling over.
To assure reliable footing, the system must be securely anchored on a level and firm base.

10. Protective Devices



System operation is stopped by the Emergency-STOP master switch located at the instrument panel.

- Inadvertent contact with all hot system components is prevented by the protective housing.

11. Emergency Drill



Disable the system by activating the Emergency-STOP master switch.

- Release water pressure by opening a high-pressure spray gun.

12. Guidelines and Regulations

In the Federal Republic of Germany the operation of this system is subject to the Regulations for Liquid Spraying Devices (VBG ZH 1/406), published by the Principal Organisation of the Commercial Employers' Liability Insurance Association. The guidelines may be ordered from Carl Heymann Verlag KG, Luxemburger Strasse 449, D-50939 Cologne, Germany.

Among other requirements, the Regulations foresee a system inspection by a certified professional in intervals of no more than 12 months. The results of the inspection must be documented in writing.

A testing log for entering the inspection results is located at the end of this manual.

Kärcher customer service engineers qualify as certified professionals, and are authorised to carry out the aforementioned inspection.

Also applicable are the (German) Regulations governing liquid spraying devices, VBG 87, and the Ordinance on Hazardous Substances VBG ZH 1/220 (GefStoffV).

Please also observe local regulations concerning electrical connections, water supply and waste-water connections. The applicable regulations may be obtained from the respective utility companies.

Any connection and installation work in accordance with the aforementioned regulations must be carried out by the Kärcher customer service or authorised contractors.

13. Proper Use of the Equipment

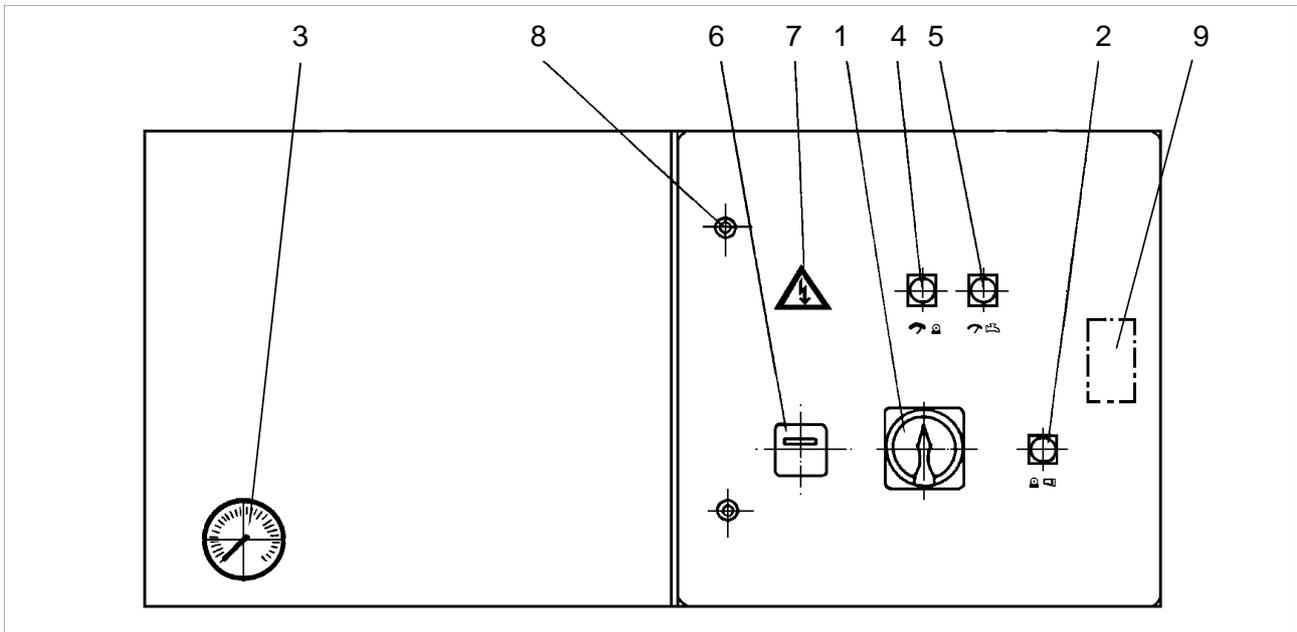
This system conveys water under high pressure to high-pressure cleaning stations situated downstream of the system. The system is designed for stationary installation in a dry indoor environment. At the installation site, a water and mains power connection satisfying the criteria stated in the Specifications section of this manual must be provided. The environmental temperature at the installation site must not rise above 40 °C. The high-pressure water is distributed via a fixed-installation tubing network.

Only clean water may be used as a high-pressure medium. Water contamination of any kind would cause premature component wear or lead to deposits within the system.

In the presence of water hardness exceeding 15°dH appropriate water treatment measures for lowering the hardness point.

The use of recycling water requires prior discussion with Kärcher.

1. Operating Controls



1		Emergency-STOP master switch Q1	Switches the system ON and OFF; also serves as Emergency-STOP switch.
2		Unlock button with operational indicator light	starts the availability time of the pump by the press of the button serves for resetting after malfunctions is alight when the pump is running and during the availability time
3		Pressure gauge	Indicates the pressure downstream of the pump; also serves as function control.
4		Indicator lamp – Motor Fault	Illuminates when the motor protection switch has tripped, switching off the motor (motor fault).
5		Indicator lamp – General Fault	is illuminated for: – motor malfunction – drop in system pressure (at high-pressure outlet) – water temperature too high – motor temperature or oil temperature too high- insufficient water – admission pressure of hot-water pump too low.
6		Elapsed-hour meter	Counts the total pump operating hours.
7		Warning Label	Danger! Danger of Death by electrical shock! Control cabinet may be opened by trained personnel only
8		Control cabinet closure	Used for opening the control cabinet May be opened by trained personnel only
9		Fault indication on the printed circuit board	indicates following malfunctions: 1 insufficient water, water temperature too high 2 motor or oil temperature too high 3 admission pressure of hot-water pump too low 4 drop in pressure at high-pressure outlet

2. Using Emergency-STOP



Turn the Emergency-STOP master switch to the 0 (OFF) position.

- Open the handgun until the water pressure has dissipated.
- Using the locking feature, secure the handgun against being opened inadvertently.

3. Starting the System

Before commissioning this system it is essential that you read the Operating Instructions, and to be certain that you have understood all the information presented herein.



Danger!

- *Injury hazard through exiting water jet of high-pressure or high-temperature water. Before each system start, check high-pressure hose, tubing, valves and high-pressure lance for damages. Correct any leaks in connections or couplings without delay.*
- *Poisoning hazard or chemical burn hazard through cleaning detergents. Observe all safety instructions on cleaning detergent labels. Protect cleaning detergent storage against access by unauthorised persons.*

A sharp and powerful waterjet exits from the orifice of the spray lance nozzle. When operating the spray lance, keep in mind the following:



Danger!

- *Deadly electrical shock hazard. Do not aim the waterjet at*
 - *electrical devices and systems*
 - *at any parts of the system proper**All live components within the working area must be spray-water protected.*



Danger!

- *Injury hazard. Hazard of chemical burns caused by cleaning detergents. Scalding hazard through hot water. Do not aim waterjet at persons or animals. Strictly observe safety instructions on detergent labels.*
- *Burn injury hazard through hot system components. During hot-water operation, do not touch non-insulated pipe installations and hose couplings. Grasp the jet lance by the grip surfaces only.*
- *Injury hazard through recoil action. The force of the recoil action may throw you off balance, and you may fall down. The spray lance may whip around and injure persons standing nearby. Select a secure foothold position and firmly grasp the handgun. Never wedge the handgun trigger in the open position.*
- *Injury hazard through flying debris. Flying debris or objects can cause injury to persons or animals. Never aim the water jet at fragile or loose objects.*
- *Health hazard posed by toxic substances. Do not spray clean the following materials, because substances known to pose a risk to human health may be swirled up:*
 - *Materials containing asbestos*
 - *Materials that could possibly contain toxic substances hazardous to human health.*
- *Accident hazard due to hidden damage! Clean tires and valve stems from a minimum distance of 30 cm.*
- *Injury hazard through exiting water jet of high-pressure or high-temperature water. Only original Kärcher high-pressure hoses are optimised for the demanding use in the system. No warranty claims are accepted in the event that other types of hoses are used.*

**Danger!**

- *Health hazard through cleaning detergents.
Due to the possible adding of detergents to the system water, the water exiting from the system must not be used as drinking water.*

Switching the System ON

Open the water tap for water supply and cooling water.



Turn the Emergency-STOP master switch (Q1) to the I (ON) position.



Press the unlock button (S1).

- Carry out the cleaning procedure. The pump stops for a cleaning break of more than 15 seconds. At the same time the 6 hours of continuous availability time is started. Within the availability time the system starts automatically owing to the drop in pressure when opening a handgun.

Restoring Operational Readiness

Press the unlock button (S1).

4. Stopping the System

Turn the system's Emergency-STOP master switch to the 0 (OFF) position.



Shut OFF the water supply.

Open the handgun until the water pressure has dissipated.

Using the locking feature, secure the handgun against being opened accidentally.

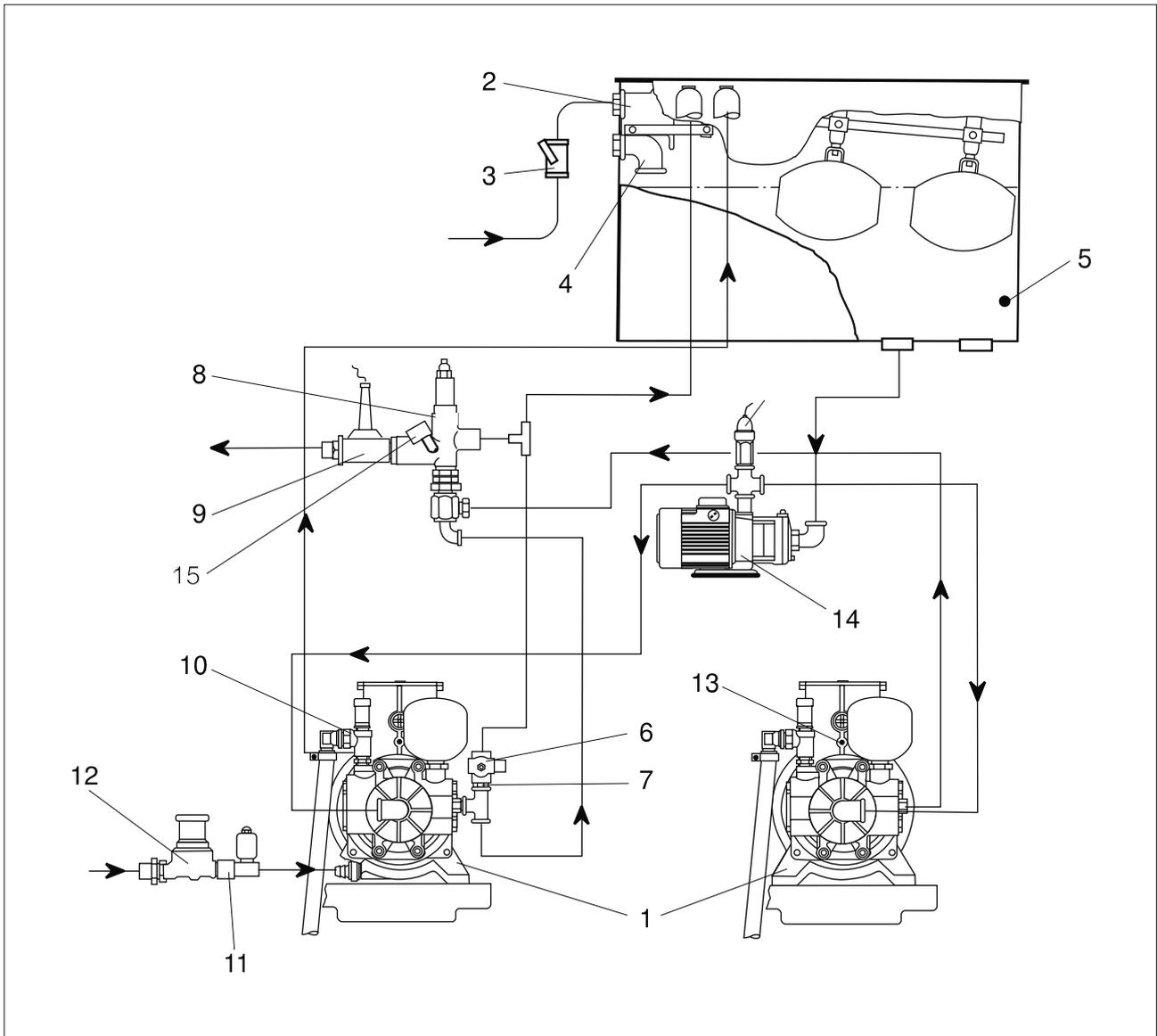
5. Frost Protection

The water-bearing parts of the system must be protected from freezing, since they could otherwise be destroyed. If the system is to be operated also in freezing temperatures, it must be installed in a frost-free location. Outdoor water lines must be frost-protected (i.e., through insulation or line heaters, or by draining during freezing temperatures).

6. System Shut-Down

If a system is to be shut down during cold periods, it must first be flushed with an antifreeze solution. As a rule, antifreeze products also contain corrosion inhibitors.

1. Flow Diagram



- | | |
|--------------------------------|--|
| 1 High-pressure pumps | 9 Flow monitor |
| 2 Float valve | 10 Safety valve |
| 3 Dirt trap | 11 Solenoid valve (cooling water) |
| 4 Overflow | 12 Pressure controller |
| 5 Low-water sensor | 13 Dashpot |
| 6 Pressure relief valve | 14 Precompression pump
(with hot-water attachment unit only) |
| 7 Filter | 15 Pressure switch |
| 8 Overflow valve | |

2. Description of Functions

Water Inlet

The water is conveyed from the float reservoir to the intake side of the two pumps. The water level in the float reservoir is maintained by the float valve (2). The incoming water is cleaned in the dirt trap (3). In the case of a float valve failure, the water exits through the overflow (4). In the event of insufficient feed water volume or failed water supply the low-water sensor (5) sends a fault signal to system control.

Pumps

The electric motor drives both pump ends (1). The pumps convey the water under high pressure to the pressure side. The starting of the motor opens the pressure relief valve with its upstream filter (7). This action connects pressure and suction sides of the pumps, and no pressure is built up. The motor is able to start free of any load.

High-pressure side

The high-pressure water passes through the overflow valve (8) and the flow monitor (9) to the high-pressure outlet, and subsequently into the high-pressure tubing system installed by the system owner. The dashpot (13) dampens the water pressure pulsing through the piston sleeve.

Pressure Control

Unused water is returned from the overflow valve to the float reservoir. If all utilisers are inactive, the overflow valve switches to idle-pressure circulation. If the outlet pressure exceeds the maximum operating pressure regardless of the overflow valve, the safety valve (10) opens.

System Control

The pump motor is started with the unlock button (S1). If the volume of water taken drops below 8 +2 litres per minute, then the after running time starts. This amounts to about 15 seconds. If the water consumption remains below the minimum quantity, then the pump stops after expiry of the after running time. Within the immediately following availability time the pump starts due to the drop in pressure caused by the opening of a handgun or by activation of the unlock button. If the water pressure drops due to leakages in the high-pressure network then the pump starts and executes leakage compensation. The availability time ends

- after approx. 6 hours,
- after six attempts at leakage compensation,
- after the switching off of the supply voltage.

After expiry of the availability time the system can only be restarted with the unlock button.

Cooling

During the operation of the pump the solenoid valve (11) is kept in the open position. This allows cooling water to flow through the pressure regulator (12) and circulate through the cooling coils of the motor. The flow of cooling water is set by means of the pressure controller. Once the cooling water has passed through the cooling coils it is returned to the float reservoir.

1. Equipment Features

		HD 4000 C 1.509-035	HD 4000 CH 1.509-115	HD 4000 C Scandinavia 1.509-515	HD 4000 C Scandinavia 1.509-515 with hot-water accessory kit 2.638-689
Supply volume	L/h	3900	3900	3900	3900
Operating pressure*	bar	100	100	100	100
Max. operating pressure (safety valve)	bar	130	130	130	130
<u>Dimensions:</u>					
Length	mm	1090	1090	1090	1090
Width	mm	615	615	615	615
Height (without pedestal)	mm	1070	1070	1070	1070
Weight (empty)	kg	245	245	245	245
<u>Capacity:</u>					
Float reservoir (max. capacity)	L	63	63	63	63
Pump housing (motor oil, order no. 6.288-061 1-Litre packaging)	L	2 x 1.8	2 x 1.8	2 x 1.8	2 x 1.8
Sound level	dB(A)	approx. 80	approx. 80	approx. 80	approx. 80
Sound level (sound-insulated version)	dB(A)	approx. 70	approx. 70	approx. 70	approx. 70

* upon request, lower values can be set by customer service.

1. Equipment Features

		HD 6000 C 1.967-045	HD 6000 C 1.967-045 with hot-water accessory kit 2.638-697
Supply volume	L/h	5600	5600
Operating pressure*	bar	60	60
Max. operating pressure (safety valve)	bar	90	90
<u>Dimensions:</u>			
Length	mm	1090	1090
Width	mm	615	615
Height (without pedestal)	mm	1070	1070
Weight (empty)	kg	260	260
<u>Capacity:</u>			
Float reservoir (max. capacity)	L	89	89
Pump housing (motor oil, order no. 6.288-061 1-Litre packaging)	L	2 x 1.8	2 x 1.8
Sound level	dB(A)	approx. 80	approx. 80
Sound level (sound-insulated version)	dB(A)	approx. 70	approx. 70

* upon request, lower values can be set by customer service.

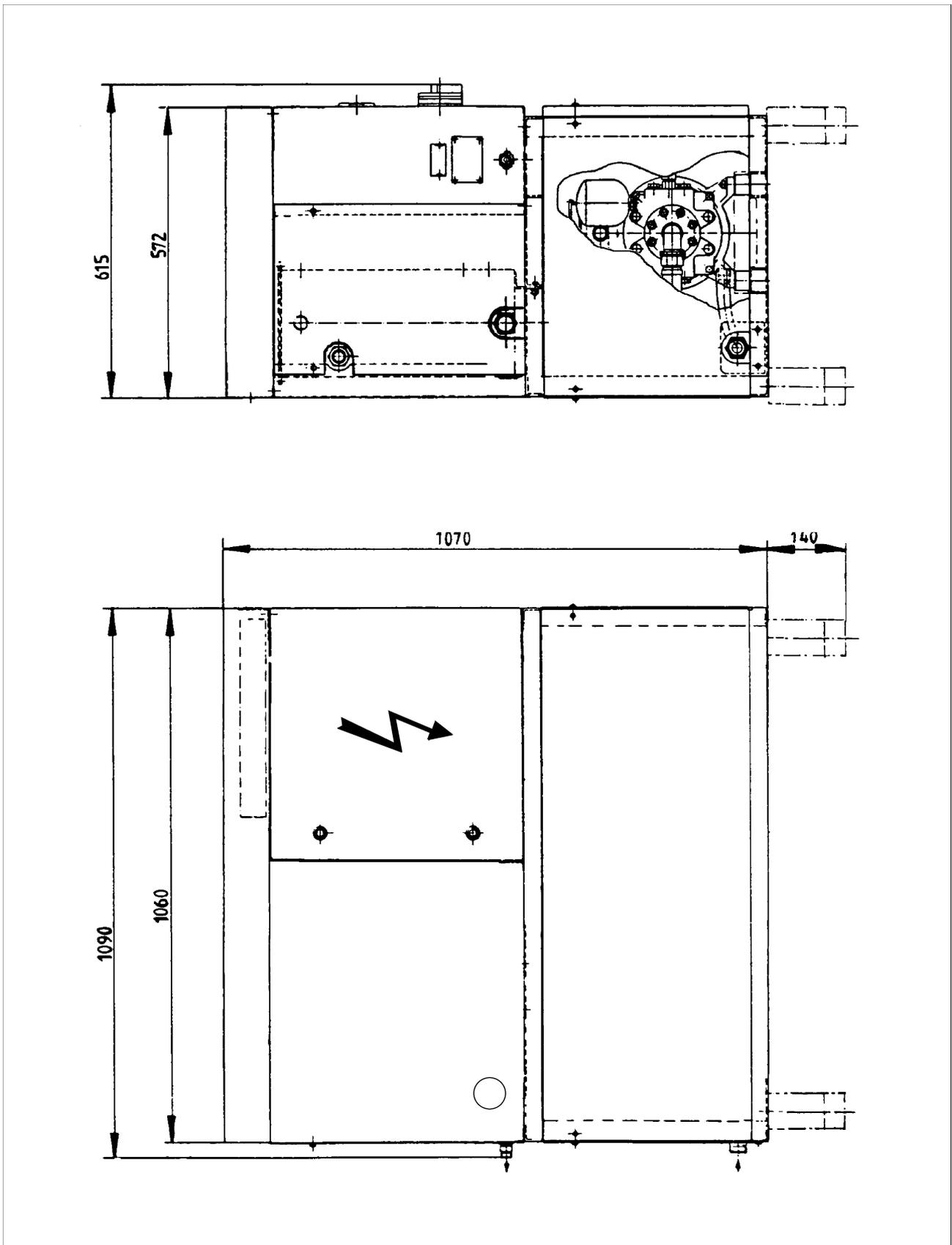
2. Connected Loads

		HD 4000 C 1.509-035	HD 4000 CH 1.509-115	HD 4000 C Scandinavia 1.509-515	HD 4000 C Scandinavia 1.509-515 with hot-water accessory kit 2.638-689
<u>Mains power:</u>					
Power type		3 ~ 50 Hz	3 ~ 50 Hz	3 ~ 50 Hz	3 ~ 50 Hz
Voltage	V	400, IEC 38	400, IEC 38	220 to 240	220 to 240
Nominal load (max.) with water temp. of 20 °C	kW	15	15	15.5	15.5
Power supply cable	mm ²	4 x 10	4 x 10	4 x 16	4 x 16
Control cable	mm ²	5 x 1.5	5 x 1.5	5 x 1.5	5 x 1.5
Motor starter (type)		λ - Δ	λ - Δ	λ - Δ	λ - Δ
External pre-fusing	A slow	50	50	63	63
<u>Water:</u>					
Flow volume	L/h	3900	3900	3900	3900
Max. supply temperature	°C	60	80	60	80
Min. flow pressure	bar	2	2	2	2
Max. flow pressure	bar	6	6	6	6
Supply line, nominal dia.	mm	25	25	25	25
<u>Cooling water:</u>					
Flow volume	L/h	200 to 220	200 to 220	200 to 220	200 to 220
Supply temperature	°C	approx. 10 to 18	approx. 10 to 18	approx. 10 to 18	approx. 10 to 18
Min. flow pressure	bar	2	2	2	2
Max. flow pressure	bar	8	8	8	8
Supply line, nominal dia.	mm	15	15	15	15

2. Connected Loads

		HD 6000 C 1.967-045	HD 6000 C 1.967-045 with hot-water accessory kit 2.638-697
<u>Mains power:</u>			
Power type		3 ~ 50 Hz	3 ~ 50 Hz
Voltage	V	400	400
Nominal load (max.) with water temp. of 20°C	kW	15	15
Power supply cable	mm ²	4 x 10	4 x 10
Control cable	mm ²	5 x 1.5	5 x 1.5
Motor starter (type)		λ - Δ	λ - Δ
External pre-fusing	A slow	50	50
<u>Water:</u>			
Flow volume	L/h	5600	5600
Max. supply temperature	°C	60	80
Min. flow pressure	bar	2	2
Max. flow pressure	bar	6	6
Supply line, nominal dia.	mm	40	40
<u>Cooling water:</u>			
Flow volume	L/h	250	250
Supply temperature	°C	approx. 10 to 18	approx. 10 to 18
Min. flow pressure	bar	2	2
Max. flow pressure	bar	8	8
Supply line, nominal dia.	mm	15	15

3. Dimension Diagram



1. Maintenance Contract

Only a properly maintained system is really safe. It is in your best interest to ensure that regular system maintenance procedures are carried out according to the maintenance schedule outlined below.

You may wish to enter into a maintenance contract with the authorised Kärcher customer service in your area. A maintenance contract is highly recommended.

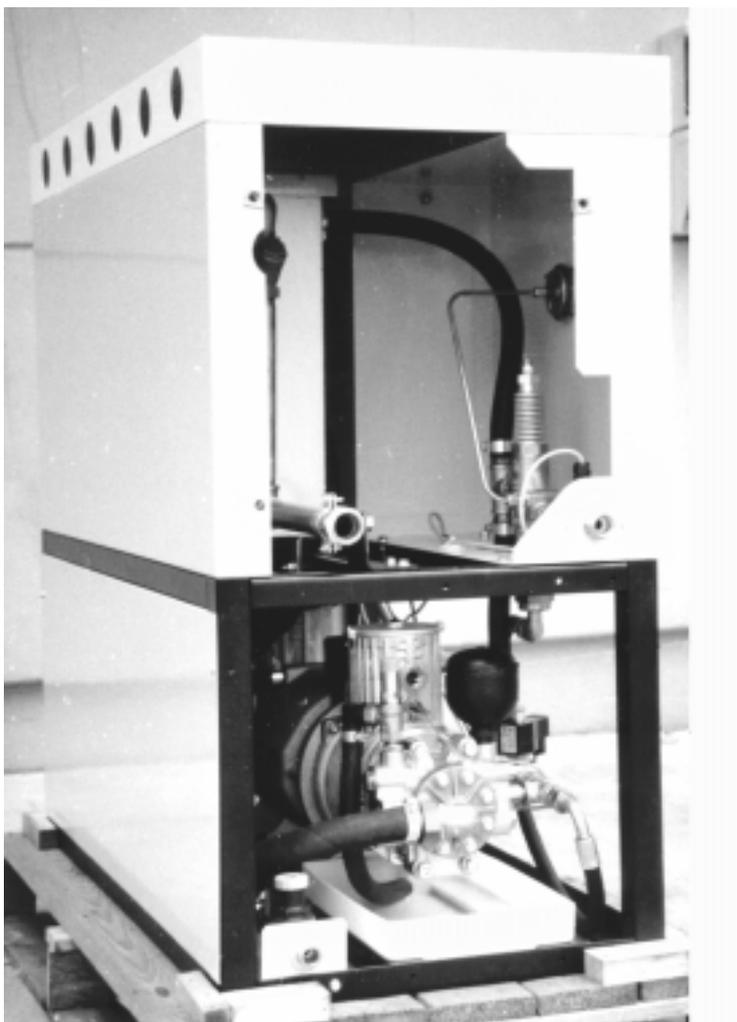
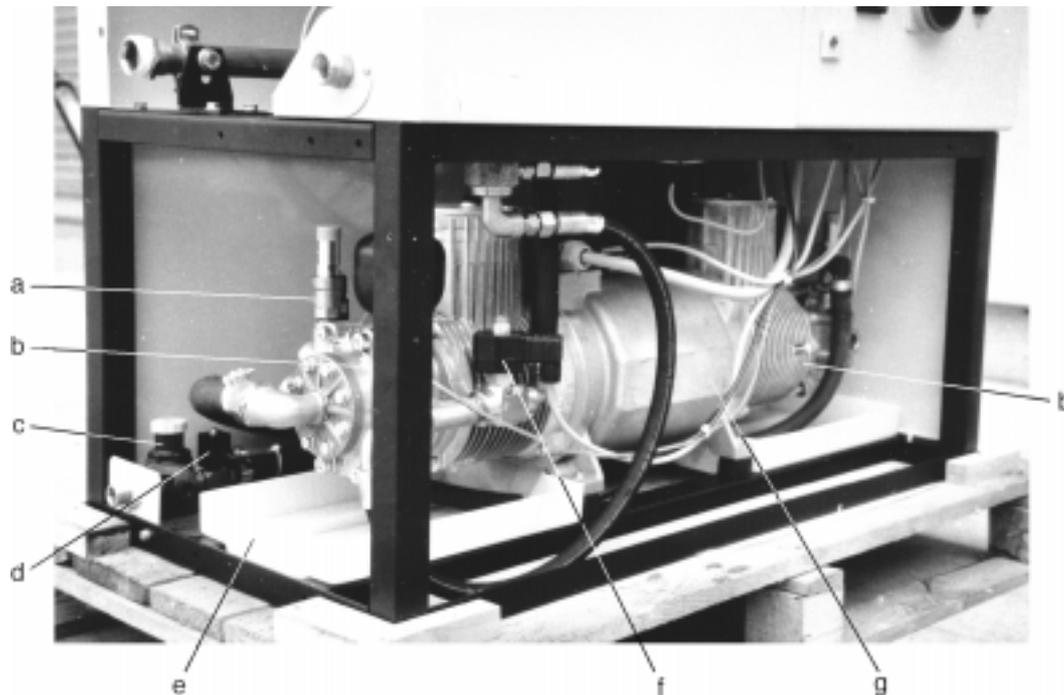
2. Maintenance Schedule

In system maintenance, use only original parts supplied or recommended by the manufacturer. Observe all safety and operating instructions packaged with these spare parts. In particular, this applies to:

- Spare parts and wearing (consumable) parts
- Accessory parts
- Operating media
- Cleaning media.



- *Accident hazard through improper maintenance procedures!*
Without exception, maintenance work and service repairs must be performed by personnel or by the Kärcher customer service.
- *Injury hazard through exiting water jet of high-pressure or high-temperature water.*
Release system pressure before performing work on system components.
In the case of hot-water operation, allow unit to cool before commencing work.
- *Electric shock hazard.*
Switch OFF and secure master switch before commencing work on the system.



- a Safety valve
- b Pump side
- c Pressure controller
- d Solenoid valve (cooling water)
- e Drip pan
- f Pressure relief valve
- g Cooling coil
- h Float reservoir with float valve
- j Overflow valve, pressure switch
- k Flow monitor
- l Oil level sight glass
- m Dashpot

Interval	Procedure	Subject Assembly	Activity	By whom
Daily	Check handgun	All handguns	Check whether handgun closes properly. Check function of safeguard against inadvertent operation. Replace defective handguns.	Operator
	Check high-pressure hoses	Outlet lines & hoses leading to workstations	Check hoses for damage. Replace defective hoses immediately. Accident Hazard!	Operator
Weekly, or after 40 operating hours	Check system for leaks	Entire system	Check pump, overflow valve and tubing installation for leaks. If oil is present in the drip pan under pump, or if a leak exceeds 10 drops of water per minute, call customer service immediately. Keep weep holes unblocked.	Operator/ Customer Service
	Check oil level	Both pump sides	Check pump oil level. MIN level: Centre of oil sight glass. MAX level: up to mark in housing. If required, top up with oil (part no. 6.288-061).	Operator
	Check oil quality	Both pump sides	If the oil appears milky, it must be changed. In this case it is recommended to change the pump oil seal also. (Customer service.)	Operator/ Customer Service
	Check working pressure	Pressure gauge in control panel	Check system water pressure (pressure gauge). If pressure is too high or too low, investigate and remedy the cause (see also the section on Trouble Shooting).	Operator
	Check hose quick-coupling	Hose quick-couplings between system tap and high-pressure hose to handgun.	Pump must be running. Check for leakage in tandem and individual operation. Connect clutch and check clutch locking function. Replace defective clutches.	Operator Customer Service
	Check dashpot	Dashpot on each pump side	A defective dashpot is readily identifiable through increased pump vibration. Replace defective dashpot.	Operator Customer Service

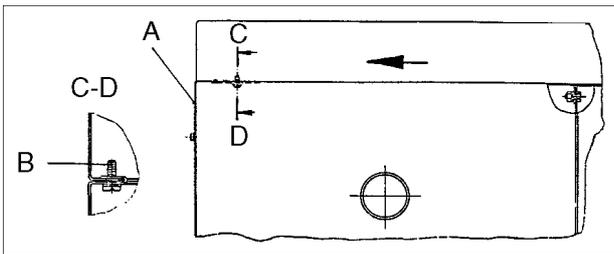
Interval	Procedure	Subject Assembly	Activity	By whom
monthly, or after 200 operating hrs.	Check overflow valve	Overflow valve	Dependent on the number of high-pressure handguns used, the pressure reading fluctuates between the preset value and approx. 15 bar below the same. On closing all handguns, the gauge will read approx. 0 bar. In the event of malfunction, call customer service.	Operator Customer service
	Check low-water sensor	Float switch in float reservoir	For about 5 seconds press down the float of the low water protection facility and check the fault indication on the printed circuit board. If necessary remove any deposits.	Trained operator authorised to open control cabinet
	Clean strainers	Dirt trap upstream of float reservoir, Pressure controller	Switch OFF unit, turn OFF water, release pressure. Disassemble and clean strainers.	Operator
	Check float valve	Float reservoir	Water level must stand 40 mm below the overflow weir. With float valve closed, no water may exit. For adjustment information, refer to the Service Manual.	Operator
	Check pressure relief valve	Pressure relief valve on pump	When functioning correctly, the motor must reach full RPM within 2 seconds. If required, clean the strainer upstream of the pressure release valve. Prior to cleaning: Shut OFF water, set Emergency-STOP master switch to OFF.	Operator
	Check run-on interval	System control	Close utiliser (e.g. handgun). After the after running time (approx. 15 sec) the pump must switch off.	Operator
	Check automatic switching on	Pressure switch	The pump is stationary as no water is being drawn. Open the handgun. When the pressure in the high-pressure network drops below 25 bar, the pump must switch on.	Operator
	Tighten hose clamps	All hose clamps in/on the unit	Tighten hose clamps with torque wrench. Torque: 28 mm nominal diameter: 2 Nm 29 mm nominal diameter: 6 Nm	Operator

Interval	Procedure	Subject Assembly	Activity	By whom
Semi-annually, or after 1000 operating hours	Oil change	All high-pressure pumps	CAUTION! Hot Oil Scalding Hazard. Prior to oil change, allow pump to cool for 15 minutes. Drain oil and fill pump on each side with 1.8 L oil, part no. 6.288-061. Do NOT use alternate oil products!	Operator
	Check unit for lime deposits	Entire water system	Functional faults on valves or pumps may indicate calcification. Use procedures outlined on the following pages.	Operator trained in decalcification procedures
	Tighten terminal strips	Control cabinet	Tighten all terminal strips of components master mains power circuit.	Electrician
Annually	Safety check	Entire system	Safety inspection pursuant to guidelines covering liquid spraying devices. Refer to section A.12.	Expert/ Customer service

3. Removing the Cover

Certain repair or service procedures may require the removal of the cover. Proceed as follows:

- Remove cover, "A".
- Remove both cover retaining screws, "B".
- Slide off cover horizontally, as indicated by the arrow.



4. Decalcification



Danger!

Explosion hazard through flammable gases! Smoking is prohibited when carrying out decalcification procedures. Ensure adequate ventilation.



Caution!

Acid hazard! Protective goggles and gloves must be worn.

Lime deposits throughout the water lines of the high-pressure system create increased pipe-run resistance and may result in the failure of calcified components.

According to official regulations, only approved boiler scale dissolvants (de-scaling acid) with test mark may be used.

For scale removal in the high-pressure system, the use of KÄRCHER scale dissolvants should be given preference (RM 100 ASF, hydrochloric acid-free, part no. 6.287-008, or RM 101 ASF, containing hydrochloric acid, part no. 6.287-013).

These products are balanced for use in conjunction with the materials present throughout the system. After decalcification we recommend neutralising the remaining acid residues by flushing the system with an alkaline solution (pH value 7–8).

The instructions for use and accident prevention regulations (dilution according to label specifications), and in particular VBG1, § 4, 14, and 44–47 must be observed.

Proceed as follows:

Begin by decalcifying the float reservoir:

Close water supply.

Remove cover as discussed in para. 3, above. Remove the float reservoir lid.

Remove the hose connecting the pump suction side with the float reservoir, pump side. Block the free end of the hose. Pour in 7-percent de-scaling solution. After the conclusion of decalcification, remove all scale residues from the reservoir!

Decalcifying high-pressure system:

Disconnect high-pressure hose from water supply inlet and hang into float reservoir.

Next, use the decalcifying acid solution pre-mixed in the float reservoir for short-term system operation in circulation (idle pressure) mode. Allow chemicals to activate, and conclude by flushing the system.

Decalcifying the cooling coil for the pump motor:

If the flow of cooling water falls below the prescribed rate (see Technical specifications), in spite of sufficient input pressure and a clean strainer in the pressure reducer, then the cooling coil must be decalcified.

Close the cooling water supply.

Remove, i.e., pull off, the water hose from the solenoid valve and hang into a catch container. Remove cooling water hose from float reservoir, position open end of hose at suitable height and fill with de-scaling solution. Allow to activate and conclude by flushing repeatedly.

Problem	Possible Cause	Remedy	by whom
High-pressure pump fails to come up to pressure	Leaking suction-side tubing system	Check fastener and hose connections	Operator
	Water starvation	Correct the cause	Operator
	Defective valve in pump High-pressure solenoid valve fails to close	Replace valves	Customer Service
Pronounced pump knock, pressure gauge pointer oscillates	Defective dashpot	replace	Operator
	Pump is drawing air	Check suction line	Operator
	Defective valve seat or valve spring	Replace as required	Customer Service
With hot-water accessory kit only	Defective or calcified precompression pump	Check precompression pump	Operator
Overflow volume is blown out into open, and/or safety valve is activated	Blown hose between overflow valve and float valve	replace	Operator
	Defective overflow valve CAUTION: For safety reasons, excess water is vented outdoors. Shut down the system!!	Repair or exchange overflow valve	Customer Service
Water is returning to float reservoir despite full-volume usage	System is calcified	Decalcify system circuits (refer to Maintenance section)	Operator
	Defective spray lances and/or nozzles.	Check spray lances	Operator
	Defective overflow valve	Check overflow valve	Cust. Service
Overflow valve cycles ON and OFF despite zero usage	Leak in high-pressure system, defective spray gun.	Repair leak	Operator
	Leaking non-return valve or control piston seal in overflow valve	Repair overflow valve	Customer Service
Pump does not reach working RPM with \wedge and/or Δ - starter.	Blocked strainer upstream of solenoid valve	Clean strainer	Operator
	Defective pressure relief solenoid valve	Replace solenoid valve	Customer Service

Problem	Possible cause	Remedy	by whom
 General fault and "Water supply fault" LED light up on printed circuit board	Insufficient water in float tank	Check site water supply	Operator
	Temperature of the water inlet too high	Reduce inlet temperature	Operator
 General fault and "HD pump temperature fault" LED light up on printed circuit board	Cooling water quantity too low: Strainer in pressure reduction valve contaminated	Clean strainer	Operator
	Mains water pressure too low	Raise pressure	Operator
	Cooling coil calcified, solenoid valve defective	Decalcify, replace solenoid valve	Operator
	Oil level too low	Check oil level	Customer Service
 General fault and "Admission pressure of hot-water pump too low" LED light up. (Only with ABS hot water)	Rotation direction of precompression pump wrong	Change rotation direction	Electrician
	Pressure switch precompression hot-water pump in the ABS hot water defective	Replace pressure switch	Customer Service
 General fault and "Drop in system pressure" LED light up on the printed circuit board (flow without pressure longer than 15 seconds)	Too many utilisers simultaneously opened	Close down some utilisers	Operator
	Pipe burst in the high-pressure network	Turn off installation and repair pipeline	Customer Service
	Pressure switch defective	Replace pressure switch	Customer Service

 Motor fault lights up	Motor protection switch Q1 or Q2 has triggered owing to overcurrent or drop-out of one phase of power supply system Motor protection switch falsely set Pressure at pump outlet too high	Check voltage of the three phases Set in accordance with circuit diagram Check pressure, adjust as necessary	Customer Service/ Electrician Customer Service/ Electrician Customer Service
Available time is less than 6 hours	Site high-pressure network is leaky Pressure switch defective	Seal it off Replace	Operator Kundendienst
System does not start up when unlock button is pressed, no indicator light illuminates	Site power supply interrupted Emergency-STOP master switch off Motor protection switch for control system and precompression pump has been triggered Control-circuit fuse on transformer defective Printed circuit board defective, green LED does not blink EPROM loose	switch on switch on check replace, check cause replace, check install again, check cause	Operator Operator Customer Service / Electrician Customer Service / Electrician Customer Service Customer Service / Electrician

System runs for about 15 sec after pressing the unlock button and then switches off. General fault and "Admission pressure of hot-water pump too low" LED light up	Admission pressure of hot water too low Pressure switch precompression hot-water pump or cable in ABS hot water defective	check pump rotation direction, check water intake replace	Customer Service Customer Service
Pump starts during available time but not by opening the handgun	Pressure switch or cable to pressure switch defective	replace	Customer Service
Unlock button activated, "operational" indicator light illuminates, system does not start up	Pressure switch defective	replace	Customer Service
While activating the HD pistols the unit switches itself off	Flow switch does not function	check flow switch	Customer Service/ Electrician
Unlock button activated, system starts up, "operational" indicator light does not illuminate	"operational" indicator light defective	switch Emergency-STOP master switch Q1 to position 0, open control cabinet and verify or replace components	Customer Service/ Electrician
System does not switch on	Flow switch S2 defective	replace upper part of flow switch	Customer Service/ Electrician
Remote start button does not function	System in a malfunction state	eliminate the cause and press unlock button	Operator

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1. Placement

The system must be installed in dry indoor surroundings free from explosion hazard. The components shall be placed on firm and level ground, and the system must be easily accessible for the purpose of maintenance procedures. The room temperature must not exceed 40 °C.

Additional height-over-floor obtained through the use of the component feet (140 mm length) facilitates maintenance access. In the absence of sufficient space the elastic feet can be used by themselves.

2. Connections

The water and waste-water connections, as well as the connection with the electrical mains network may only be carried out by licensed and authorised professional contractors pursuant to local regulations. In the Federal Republic of Germany the following regulations apply:

- VDMA guideline, standardised leaflet 24416 "Fixed-Installation High-Pressure Cleaning Systems"
- VDE Regulations (VDE = Professional Association of German Electricians)
- Regulations issued by local utility companies

Both the required water supply and the electrical mains network connection must be configured for permanent operation. The specified connective load values are stated in the Specifications.

The water supply must be equipped with a shutoff valve, and must be connected with the high-pressure by means of a flexible high-pressure hose. Insufficient supply line cross section or insufficient admission pressure will result in water starvation. To prevent pump damage, a low-water condition will automatically result in system shut-down.

In the event of excessive admission pressure or the occurrence of pressure peaks in the mains network, the installation of a pressure regulator upstream of the system is mandatory.

The motor cooling circuit within the system requires a separate cold-water connection.

A water drain must be present at the installation site.

3. High-pressure Installation

The link between the fixed-installation pipe network and the system must be executed in the form of a flexible high-pressure hose connection.

The permanent pipe network installation must consist of as many straight runs as possible. All high-pressure tubing must be installed pursuant to regulations, using vibration-dampened strain relief and fixed pipe or tubing clamps, while allowing for longitudinal expansion/contraction due to the effects of temperature and pressure.

To keep pressure losses in the high-pressure lines as low as possible, the following recommendations should be used as mandatory guidelines:

Delivery volume	Tubing line	Hose size
1000 L/h	NW 10 (3/8")	NW 8
2000 L/h	NW 15 (1/2")	NW 12
3000 L/h	NW 15 (1/2")	NW 12
4000 L/h	NW 20 (3/4")	NW 16
6000 L/h	NW 25 (1")	NW 20

It should be understood that the above guidelines still require additional allowances for the overall tubing length, the number of directional changes and armatures.

AUTHORISED PROFESSIONAL PERSONNEL ONLY**4. Hard-water Treatment**

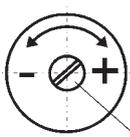
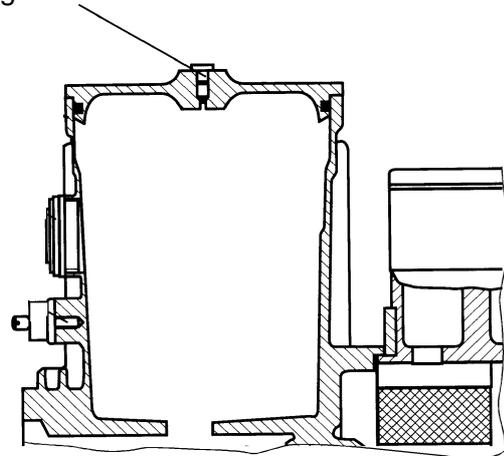
Excessive water hardness (>15° dH) can lead to deposits and result in malfunctions. Contact the manufacturer in the event of unusually high degrees of water hardness.

5. Preparations for Commissioning

- Thoroughly rinse entire HD system (HD 4000/6000 C also). Check entire HD system for correct assembly and lack of leaks.
- Complete electrical connections in accordance with the Specifications contained in the Operating Instructions.
- Check the function of decalcifying component (if required).
- Check water supply for required delivery volume and maximum allowable temperature.
- Check cold-water cooling circulation: Verify cooling water volume (refer to Specifications) and connection data.

- Install float reservoir overflow line
- Check pump oil level. Remove threaded plug from oil reservoir.

Threaded
plug



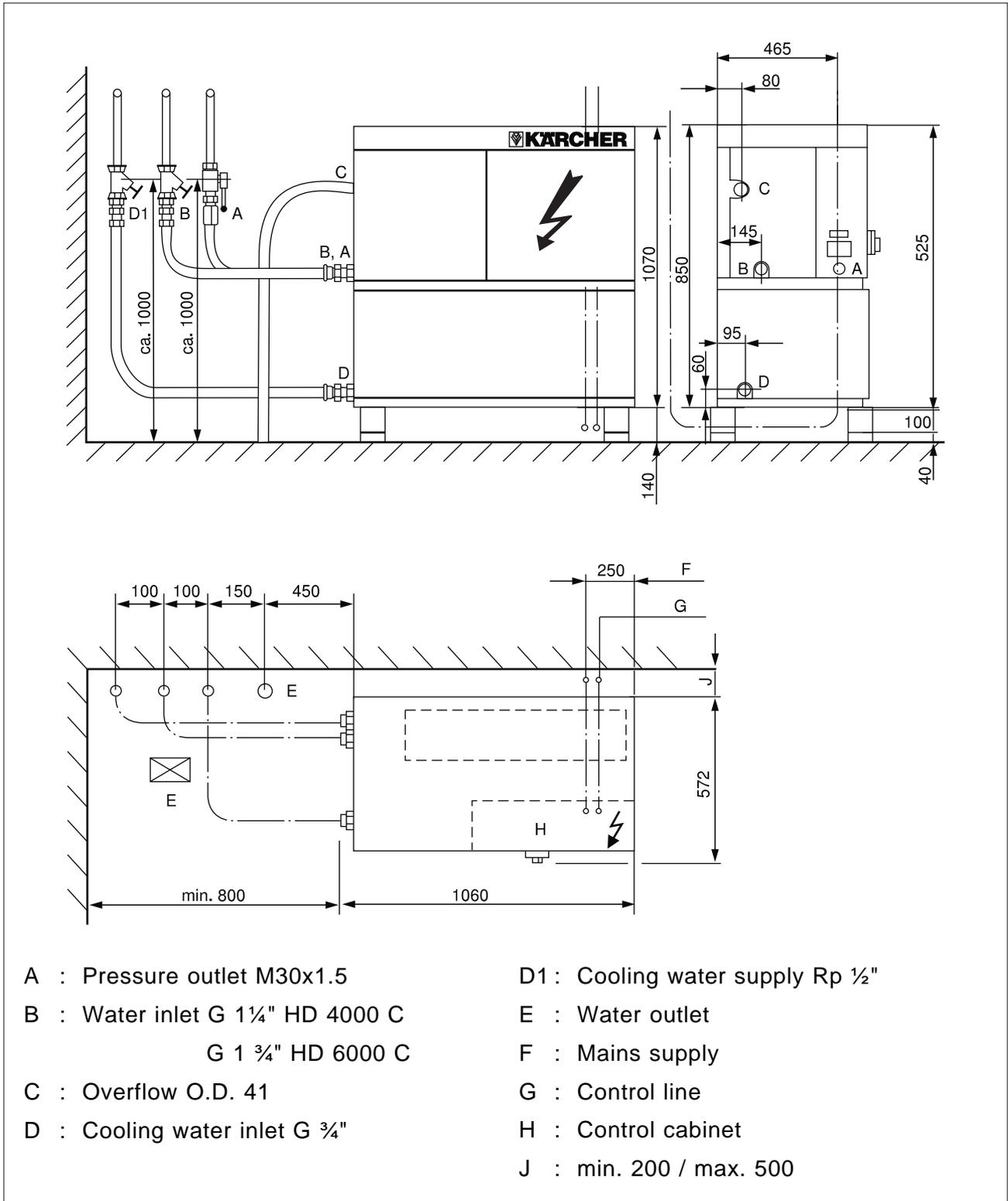
Adjusting cooling water volume on pressure regulator.

Locking screw

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6. Space Assignment Plan



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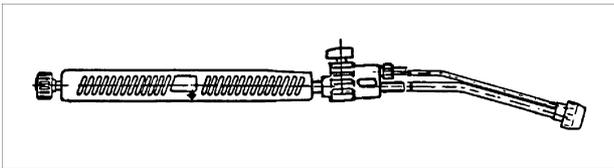
Handguns with different spray lances

Dependent on the cleaning application, different spray lance extensions are required, ranging from 250 mm for one-hand operation to 2040 mm for cleaning high objects.



Spray lance with bypass valve

Featuring two spray patterns and operation in conjunction with cleaning detergents, length approx. 1000 mm.



Nozzles

Several nozzles with different spray angles are available for the system. The nozzles are mounted on the spray lance by means of a union nut, and are easily changed. Recommended nozzle size is size 07.

Designation	Spraying angle	Order no. 6.415-
1507	15°	-305
2507	25°	-287
4007	40°	-288

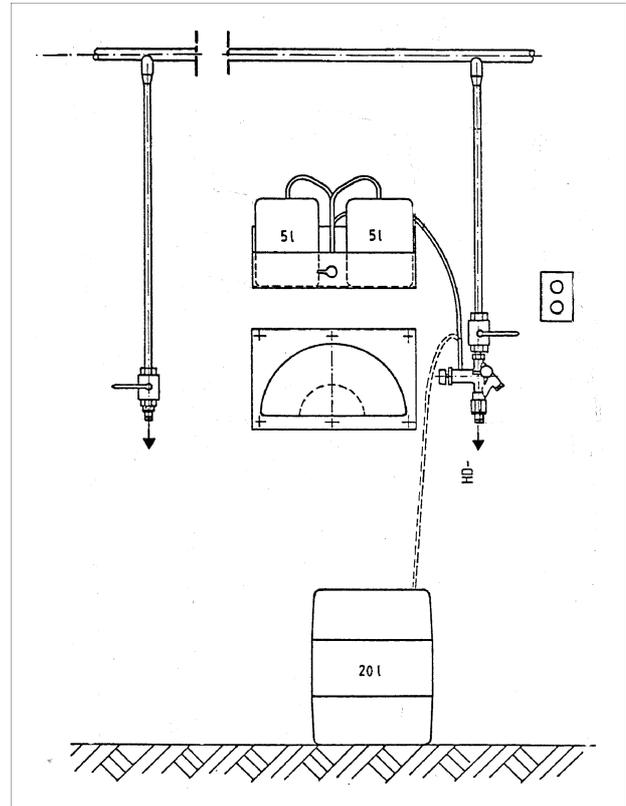
Force of recoil from the handgun when using these nozzles:

HD 4000 C	100 bar	43 N
HD 6000 C	60 bar	25 N

The spraying device (i.e., handgun) is connected by means of an in-line quick-coupling.

System tap / workstation

Features injector for metering cleaning detergent into pressure side, wall-mounted container console and hose keeper, remote release.



Hot-water accessory kit

This accessory kit permits an increase of the water supply temperature to a maximum of 80°C.

Cleaning detergents

Cleaning detergents facilitate any cleaning task. A selection of cleaning agents is listed in the table on the following page. When using detergents it is essential to observe the instructions supplied on the product labels.

The following types of cleaning detergents must not be used with this system:

- Detergents containing nitric acid
- Detergents containing active chlorine

Using these types of detergents will result in damage to unit components.

Area of application	Contamination type Application method	Cleaning agent	Approx. pH value 1 %-solution
Automotive, petrol stations, motor carriers, vehicle fleets	Dust, road grime, mineral oils (on painted surfaces)	RM 55/1000-liquid ASF ** RM 22/80-powder ASF RM 81-liquid ASF RM 803-liquid ASF	slightly alkaline alkaline alkaline alkaline
	Vehicle protection	RM 820-hot wax ASF RM 821-spray wax ASF RM 824-Super-Perlwachs ASF	neutral neutral neutral
Metal-working industry	Oils, greases, dust and similar contamination	RM 22-powder ASF RM 55-liquid ASF RM 81-liquid ASF RM 31-liquid ASF (heavy contamination)	alkaline slightly alkaline alkaline strongly alkaline
		RM 39-liquid (with corrosion protection)	slightly alkaline
Food processing industry	Light to medium contamination, greases/oils large surfaces	RM 55-liquid ASF RM 81-liquid ASF	slightly alkaline alkaline
		RM 58-liquid ASF (foaming cleanser) RM 31-liquid ASF *	alkaline strongly alkaline
	Smoky resin	RM 33-liquid *	strongly alkaline
	Cleaning and disinfecting	RM 32-D-liquid	alkaline
	Disinfecting	RM 735-D-liquid	alkaline
	Lime, mineral deposits	RM 25-liquid ASF * RM 59-liquid ASF (foaming cleanser)	strongly acidic acidic
Sanitary installations	Lime, urinal deposits, soaps, etc.	RM 25-liquid ASF (basic cleaning)	strongly acidic
		RM 59-liquid ASF (foaming cleanser)	acidic
		RM 68-liquid ASF	acidic

* = for short-term use only. Two-step method. Flush with clean water.

** = ASF = abscheidefreundlich

System Type:

Works No.

Commissioned: (date)

Inspected:
(date).....

Results/Comments:

.....
Signature

Inspected:
(date).....

Results/Comments:

.....
Signature

Inspected:
(date).....

Results/Comments:

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Signature

Inspected:
(date).....

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