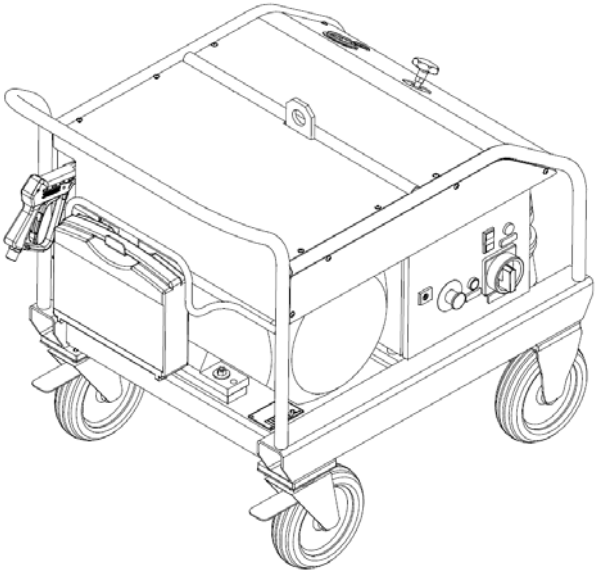
DYNAJET
Water Jetting Systems up to 3,000 bar

Operating Instructions

For machine operator and maintenance staff
Always keep by the machine

High pressure cleaner Dynajet 500me 30
Art. no. 1518020,1518050
Machine no.



1 About these Operating Instructions

In this chapter you will find notes and information that will help you use these Operating Instructions. Do not hesitate to contact us if you have any queries:

DYNAJET GmbH
Wilhelm-Maybach-Straße 2
D- 72622 Nürtingen
Telefon +49 (7022) 30411-30
Fax +49 (7022) 30411-50
Internet: http://www.dynajet.de
E-mail: info@dynajet.de

or the branch or services agent responsible for you.

Address: _____

_____

_____

Telephone: _____

Fax: _____

E-mail: _____

1.1 Foreword

These Operating Instructions are intended to familiarise the user with the machine and to assist him in using the machine properly in various possible applications.

The Operating Instructions contain important information on how to operate the machine safely, properly and economically. Taking these instructions into consideration will help

- to avoid dangers,
- to reduce repair costs and downtimes
- to increase the reliability and service life of the machine.

The Operating Instructions must be supplemented by the relevant national rules and regulations for accident prevention and environmental protection.

The Operating Instructions must always be available wherever the machine is in use.

The machine owner must make the location of these Operating Instructions known to all personnel charged with performing jobs on the machine and ensure they are accessible. These operating instructions must be read and applied by any person who carries out work with or on the machine, e.g.

- operation, including setting up, fault rectification in the course of work, removal of production waste, care and disposal of fuels and consumables,
- service (maintenance, inspection, repair), and/or
- transport.

The generally recognized rules of technology for safe and proper working must be observed in addition to the Operating Instructions and mandatory rules and regulations for accident prevention and environmental protection in the country and place of use of the machine.

The Branch or Agent serving you, or the Nürtingen Works, will be happy to give you more information, should you have any questions following your study of the Operating Instructions.

You will make it much easier for us to answer any questions if you can give us the details of the machine model and the machine number.

These operating instructions do not include a description of the drive motor; please refer to the operating instructions provided by the motor manufacturer.

Modifications are made from time to time in the interests of constant improvement and it could be possible that we were unable to take these into consideration when these Operating Instructions were printed.

These operating instructions are not covered by the Amendment Service of Dynajet GmbH. Alterations may be made to these operating instructions without prior notification.

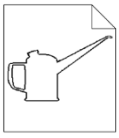
The pages are divided into chapters where they are numbered consecutively.

Example: Page 3-2
Chapter 3
Page 2

1.2 Icons and symbols

The following icons and symbols are used in the Operating Instructions:

► Action symbol
Text following this symbol describes tasks which you are required to work through, generally in the sequence shown from top to bottom.
⇒ Text after this icon describes the result or the effect of an activity.



Refer also to the maintenance charts:
This symbol is used to refer to the maintenance charts required, possibly as a supplement to the maintenance charts you are currently reading.

The following special tool is required:
This icon identifies the special tools necessary to carry out the work. Normal tools, i. e. standard tools or tools carried in the vehicle are not listed additionally.

Environmental protection

This symbol is used to identify tasks during which particular attention is to be paid to environmental protection. The associated text is written in italics and is closed off with a line.

Notes
Particular specifications with regard to the economic use of the machine are introduced with the word ”Note” and the pictogram illustrated. The associated text is written in italics and is closed off with a line.

Caution

Particular specifications or instructions and prohibitions with regard to the prevention of damage are introduced with the word ”Caution” in bold and the pictogram illustrated. The associated text is written in italics and is closed off with a line.

⚠ Danger

Particular specifications or instructions and prohibitions with regard to the prevention of personal injury or significant damage are introduced with the pictogram illustrated, the word ”Danger” written in bold and a line. The associated text is written in italics and is closed off with a line.

The appropriate symbol will be used if it is possible to identify the source of the danger precisely.

⚠ Suspended Load

This symbol is used to identify tasks in which suspended loads may fall down.

⚠ Danger of crushing

This symbol is used to identify tasks during which there is the danger of being crushed.

Heavy current

This symbol is used to identify tasks in which there is the danger of electrocution, possibly with lethal consequences.

2 Safety Regulations

This chapter summarises the most important safety regulations. This Chapter must be read and understood by all persons who handle the machine. The various regulations are also repeated once more at the appropriate points in the Operating Instructions.

Notes

Special safety regulations may be necessary for some tasks. These special safety regulations will only be found in the description of the particular task.

The following safety instructions should be regarded as a supplement to already existing valid national accident prevention regulations and laws.

Existing accident prevention regulations and laws must be observed in all cases.

2.1 Principle

Use only machines in a technically perfect condition, as designated and being conscious of safety and the dangers, taking account of the Operating Instructions. Any faults, especially those affecting the safety of the machine, must, therefore, be rectified immediately.

Make sure that

- no safety equipment is removed, rendered inoperable or modified,
- safety equipment removed for the purposes of maintenance work is refitted immediately after the work is completed.

Check operational safety every time you start work. Any defects found or suspected must be eliminated immediately. If necessary, inform the project supervisor.

If defects or faults are found or suspected during operation, operation must cease immediately. Eliminate the defect or fault before restarting.

Onwards sale

The following should be noted if you sell the machine on:
Pass on to the new operator all the accompanying documentation (Operating Instructions, Maintenance Instructions, diagrams, machine cards, inspection certificates etc.) you received with your machine.
If necessary, you may have to order the papers from us, quoting the machine number. The machine may not be sold on without the accompanying documentation under any circumstances.

Reporting an onwards sale or acquisition to Dynajet ensures that you will be sent any information relating to modifications or innovations relevant to safety, and you will also be eligible for technical consultancy from our works.

2.2 Designated use

The machine has been built in accordance with the state of the art and recognised safety rules. Nevertheless, its use may constitute a risk to life and limb of the operator or of third parties, or cause damage to the machine and to other property.
The machine must only be used as specified in the Operating Instructions and the enclosed documentation. All information and safety regulations in the Operating Instructions must be observed.
The machine is only designed for cleaning with pressurised water.
The machine supplies heated pressurised water at a maximum temperature of 95 °C.
The machine supplies pressurised water at the pressure specified in the technical data, depending on the model.
The machine must be supplied with clean, cold mains water via the low-pressure hose as described in the chapter ”General technical description” - section: ”Water quality requirements”. Other materials should not be used.

The operator must provide personal protective equipment which should be used by the operating personnel.
Personal protective equipment includes:

- Protective helmet
- Ear defenders
- Protective goggles
- Face protection visor
- Protective suit
- Protective gloves
- Protective boots

Only qualified personnel may work on the burner.

All items of the machine’s protective panelling must be fitted or connected up during operation.

The machine must be operated only with the safety equipment fitted.

Specified maintenance work should be carried out at regular intervals.

Any work on the electrical system of the machine must be carried out by trained and qualified electricians only.

Never make any modifications, additions or conversions to the machine without first obtaining the manufacturer's approval.

The operational safety of the machine must be inspected by a technical expert at least once a year. The operator is responsible for commissioning the inspection.

2.3 Use contrary to the designated use

Use of the machine other than described in the section ”Designated use”, or which goes beyond such use, is considered contrary to the designated use. Dynajet GmbH accepts no liability for damage resulting from such use. The risk of such misuse lies entirely with the machine operator.

Modifications

Never make any modifications, additions or conversions to the machine which might affect safety without first obtaining the manufacturer’s approval. This also applies to the installation and adjustment of safety devices and valves as well as to welding work on load-bearing elements.

The values quoted on the rating plate, in the Technical Data and on the machine card are the maximum permissible values.

The control and safety settings made at Dynajet GmbH must not be changed.

The machine must not be operated with deactivated, modified or defective safety devices.

Safety devices must only be repaired, adjusted or replaced by technically qualified experts.
All devices of relevance for safety must be in place and fully functional.

2.4 Liability

The operator is obliged to act in accordance with the Operating Instructions.

The safety and accident prevention regulations from the following institutions must be observed:

- Industrial Employers' Liability Insurance Association,
- the responsible corporate liability insurance company.
- the legal authorities in your country.

The following persons are liable under the law for accidents which can be ascribed to the failure to comply with safety regulations and accident prevention regulations:

- the operating personnel or (unless not liable due to lack of
- training or basic knowledge)
- their supervisors.

under the law.

Please therefore ensure that the necessary caution prevails.

Exclusion of liability

We state here expressly that Dynajet accepts no liability for damage arising from incorrect or negligent operation, servicing or maintenance or as a result of use contrary to the designated use. This statement is equally valid for modifications to, additions to and customization of the machine which may compromise safety. The guarantee will no longer be valid in such cases.

2.5 Personnel selection and qualifications

The machine may only be operated or serviced independently by persons who

- have reached the minimum legal age;
- are physically capable (rested and not under the influence of alcohol, drugs or medication);
- have been instructed in the operation and maintenance of the machine;
- can be expected reliably to execute the tasks they are charged with.

Training

The machine must only be operated, serviced or maintained by persons who are trained to carry out such tasks and have been commissioned to do so.
The areas of responsibility for personnel must be clearly defined.

The following personnel must only work on the machine under the permanent supervision of an experienced person:

- personnel who have not yet completed training or instruction,
- untrained personnel,
- uninstructed personnel,
- personnel taking a general training course.

Qualified electrician

Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with electrical engineering rules and regulations.

2.6 Sources of danger

Never reach into moving machine components, whether the machine is running or switched off. Always switch off the main switch first. Take note of the warning plate.

In the event of malfunctions, stop the machine immediately and secure it. Have any faults rectified immediately.

Secure the machine at the set-up site against rolling away by means of wedges.

Make sure that nobody is placed at risk by the running machine before starting up the machine.

Never release or tighten threaded unions that are under pressure.

Hot machine components

During and after completion of work, there is a risk of burns from hot parts on the drive motor.

Aerosol

⚠ Danger

During use of high pressure cleaners, aerosols may be formed. Inhalation of aerosols can be hazardous to health.

⚠ Danger

The employer shall perform a risk assessment in order to specify the necessary protective measures regarding aerosols, depending on the surface to be cleaned and its environment. Respiratory masks of class FFP 2 or higher are suitable for the protection against hydrous aerosols.

2.7 Safety equipment

Never remove or modify safety devices on the machine.

Any safety devices removed for set-up, maintenance or repair purposes must be refitted and checked immediately upon completion of the maintenance and repair work.

Safety devices must only be repaired, adjusted or replaced by technically qualified experts.

All equipment required for safety and accident prevention (warning signs and information plates, cover grilles, guards, etc.) must be in place. Such equipment must not be removed, modified or damaged.

2.8 Protective equipment

The following protective equipment is compulsory throughout the machine working area to limit the risk of injury to personnel.

item	Designation
1	Protective helmet
2	Ear defenders
3	Protective goggles
4	Face protection visor
5	Protective suit
6	Protective gloves
7	Protective boots

⚠ Danger

The machine operator must be informed that waterproof protective clothing only provides protection from spray water and splash particles. In the case of direct contact with the high-pressure water jet, protective equipment does not guarantee protection against injuries caused by the high-pressure water jet.
Never direct the high-pressure water jet to clean dirty protective equipment still being worn by personnel.

2.9 Risk of injury – residual risk

The machine has been built in accordance with the state of the art and recognised safety rules. Nevertheless, its use may constitute a risk to life and limb of the operator or of third parties, or cause damage to the machine and to other property.

Some of the injuries that may be caused by improper use of the machine are listed below:

- Risk of crushing and knocking when moving and setting up the machine.
- High-pressure injection at the high-pressure water pump, highpressure hose and high-pressure gun.
- Electric contact (in some circumstances with fatal consequences) with the electrical equipment. If the connection has not been made correctly or electric subassemblies are damaged.
- Risk of burning on hot machine components. This includes e.g. drive motor, burner and frame.
- Noise pollution is a danger for persons working continuously near the machine without hearing protection.
- Injuries through unauthorised starting or use of the machine.
- Injuries caused by tripping over cables, hoses or reinforcing steel.
- Biological or chemical contamination due to substances that may be dispersed in the jetting or cleaning process.

- Danger of burning and scalding at water carrying accessories like high pressure hose or the lance tube if the burner is interposed or switched on.

2.10 Risk of crushing and bumping

During the following operating modes at the machine:

- Set-up
- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decomissioning

there is a risk of injury through crushing or bumping.

Transporting the machine

If you wish to load the machine onto a transport vehicle, attaching lugs must be fitted on the machine. If your machine is equipped with attaching lugs for lifting, they are located on the upper side of the machine and are coloured for identification purposes.

⚠ Danger of chrushing

When lifting with the crane, determine the centre of gravity of the machine by lifting carefully. All cables or chains on the lifting gear must be tensioned evenly and the machine must be raised evenly at all support points.

⚠ Suspended Load

Ensure no persons are under a suspended load.

– Electrical contact (which may result in an accident causing injury or death) on the electrical equipment. If the connector is not used appropriately or electrical components are damaged.

2.11 Determination oft he recoil forces

The size and design of the nozzle on the high pressure water gun and the operating overpressure must be adapted so that operating personnel can withstand the recoil forces that occur depending on their current stance and body weight.

Notes

Only use nozzles suitable for the application in question! Refer to the corresponding nozzle table provided by the nozzle manufacturer to calculate the recoil forces!

Designation
d= diameter [mm]
p =pressure [bar]
Q = flow rate [l/min]
FR = recoil force [N]

Calculate the recoil forces in accordance with the following empirical formula:

$FR = 0,236 \times Q \times \sqrt{p}$

► Select the nozzle table relevant for your nozzle.

► Read the required values from the nozzle table.

► Caclulate the recoil force using these values.

When performing hand--guided work with a high pressure water gun, select the nozzle diameter so that the recoil force along the longitudinal axis does not exceed 250 N at maximum operating pressure.
If the recoil forces exceeds 150N, fir the high pressure water gun with a support

piece. If the recoil forces exceeds 250N the high pressure water gun must be guided mechanically.

Notes

Using angled high pressure water guns may change the recoil forces.

⚠ Danger

Only use high pressure water guns that are suitable for the maximum recoil force of the nozzle used!
See nozzle table provided by the respective manufacturer.
– Use a support piece for recoil forces between 150 N and 250 N!
– Always use a fixed water jets for recoil forces that exceed 250 N!
Always assume as stable stance when working with hand-guided high pressure water guns.

2.12 High-pressure injection

The high-pressure water pump, high-pressure hose and high-pressure gun pose a risk of high-pressure injection during the following operating modes:

- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning
-

Work with high-pressure water jets produces very high pressure that acts over a relatively small surface area. This concentration of energy can cause serious injuries.

⚠ Danger

If a high-pressure water jet makes contact with the skin, it can penetrate the surface of the skin and damage the tissue underneath. The water may inject foreign matter deep into the body and cause dangerous infections. With injuries caused by high-pressure water jets, it is not possible to assess the extent of damage to the tissue from the outside.
Treat any injuries caused by high-pressure water jets as an acute surgical emergency. Injuries of this kind require treatment from a qualified orthopaedic surgeon. Inform the acting doctor that the accident was caused by a high-pressure water jet.

Always inspect the machine for defects before starting work.
Should you identify any defects during operation, shut down the machine immediately, depressurise and have the defect repaired by a qualified technician. Depressurise the machine before decommissioning.

High-pressure hoses

It is essential that correct high-pressure hoses be carefully selected and handled correctly to maintain the operational safety of the machine.

Observe the following rules when handling high-pressure hoses:

- Only use high-pressure hoses approved to withstand the maximum operating overpressure and maximum operating temperature.
- High-pressure hoses should only be connected by qualified personnel.
- High-pressure hoses must be laid and secured in such a way as to minimise any dangers.
- High-pressure hoses must consist of functioning hoses and connections that are compatible with one another.
- High-pressure hoses must not be painted.
- Depressurise the high-pressure hoses after operating the machine.
- Do not crush high-pressure hoses or guide them over sharp edges. Avoid tensile and bending stress.
- High-pressure hoses must be stored free of kinks and tension.

High-pressure hoses are wear parts with a limited service life. They should therefore be replaced at appropriate intervals according to the operating conditions, even if there are no obvious visible external defects.

High-pressure hoses must be replaced should the following defects occur:

- Scuff marks, cuts or cracks that pierce the outer layer and reach through to the wire infill.
- Embrittlement of the outer layer (crack formation) due to improper storage.
- Storage time and usable service life have expired. As a guide value, DIN specifies 6 years plus a maximum of 4 years previous storage time for an unconnected hose.
- Leaks in the hose and at the connection point.

⚠ Danger

Never search for leaks in high-pressure hoses with your bare hands. Water escaping under high pressure may not be visible but can cause serious injury.

High-pressure gun

Correct handling of the high-pressure gun is essential to ensure the operational reliability of high-pressure cleaners.
Observe the following rules when handling high-pressure guns:

- Only use high-pressure guns that are designed to withstand the permitted operating overpressure.
- Always use the high-pressure gun with a nozzle approved for the relevant pressure and temperature range.
- Never direct the water jet at people or animals.
- Pay attention to the confines of the danger area when performing work involving high-pressure water jets. No personnel should stand within a 10 m radius of the high-pressure gun, apart from the operator.
- When operating the high-pressure gun, always hold firmly with both hands.
- The high-pressure gun produces recoil and torque when actuated. Ensure equipment is secure and stable.
- Use suitable means to support the high-pressure gun, depending on the model.
- Depressurise the high-pressure gun after operating the machine.

⚠ Danger

Waterproof protective clothing only provides protection from spray water and splash particles. In the case of direct contact with the high-pressure water jet, protective clothing does not provide sufficient protection from injury.
Wear all the necessary personal protective equipment. This also applies to all personnel standing within the working area around the machine (for their own safety).

2.13 Electrical contact

The control cabinet, electrical wiring and drive motor pose a risk of fatal injury from electrical contact during the following:

- Setting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning
-

All electrical assemblies are protected as standard, as per IEC 60204 Part1 or DIN 40050 IEC 144 in accordance with protection category IP 54.

Use only original fuses with the specified amperage! The electrical system can be destroyed by overrated fuses or overriding.

Heavy current
Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with the electrical engineering rules and regulations.

2.14 Risk of burns and scalding

The engine, exhaust system and high-pressure water pump pose a risk of burns during the following:

- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning

⚠ Danger

The control cabinet switches off the engine in the event of overheating. However, the engine, exhaust system and high-pressure water pump may become hot during operation. Allow the machine to cool before starting any maintenance work. Work with protective gloves.

⚠ Danger

Remember that the high-pressure gun poses a risk of burns as well as a risk of high-pressure injection. Wear all the necessary personal protective equipment.

Heating module

When a heating module is connected and the burner system is switched on, work can be performed with high water temperatures. The high-pressure hose and the high-pressure gun pose a risk of burns and scalding during the following:

- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning

Notes

Read the documentation accompanying the heating module.

⚠ Danger

In addition to high-pressure injection, bear in mind the risk of burns and scalding posed by the high-pressure hose and the high-pressure gun.

2.15 Place of work

The place of work is the area in which people must remain in order to carry out the work.

Machine operator

The place of work of the machine operator during operation is at the operating panel on the machine.

High-pressure gun operator

The place of work of the high-pressure gun operator is within the danger zone of the high-pressure gun. Proceed with extreme caution here. The high-pressure gun operator and the machine operator must have visual contact.

⚠ Danger

Removed material may spray back and cause serious injury. Never work alone.
If an operator falls unconsciousness or suffers serious injuries, you are advised to call for help as you will not be able to secure the machine alone.

2.16 Working area

The working area is the area in which work is carried out with and at the machine. Parts of the working area can become danger areas, depending on the job being performed.
The working area is also the area in which work is carried out with and on the high-pressure gun.
Any persons other than the operator of the high-pressure gun must keep a distance of at least 10 metres from operating area around the high-pressure gun while work is being performed.
Secure the working area and affix signs clearly indicating the dangers.
Suitable protective equipment is compulsory within the working area. The operator is responsible for safety in the working area when the machine is in use.

Conduct in emergency

Switch off the machine immediately in an emergency situation.
Refer also to chapter: ”Operation” -- section: ”Emergency shutdown procedures” for further details

Caution

In the event of malfunctions, stop the machine immediately and secure it. Have any faults rectified immediately.

2.17 Sound emissions

Sound emissions are generated during the following operating modes at the machine:

- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning

Refer to the technical data for the sound pressure level value in the vicinity of the machine.
We recommend wearing ear defenders for noises louder than 85 dB (A); the employer should provide personnel with ear defenders although this is not compulsory.

Wearing ear defenders for noises louder than 90 dB (A) is compulsory.

Notes

Wear your personal ear defenders.

Operator

Instruct your personnel always to wear their personal ear defenders.
As the operator, you are responsible for ensuring that your personnel comply with this regulation.
All soundproofing equipment must be present and in perfect condition.
This equipment must be set to protective position during operation.
High sound levels can cause permanent hearing damage.

2.18 Spare parts

Spare parts must comply with the technical requirements specified by the manufacturer. Spare parts from original equipment manufacturers guarantee this.
Use only original spare parts. Dynajet GmbH accepts no liability for damage caused as a result of using non-original spare parts.

2.19 Accessories

Accessories must meet the requirements specified by Dynajet GmbH and be compatible with one another. Using accessories from original equipment manufacturers guarantee this.

Notes

Accessories that are not included in the scope of supply delivered with the machine are supplied by Dynajet and can be purchased through Parts Sales.
Please refer to the delivery note for a list of accessories supplied.

The operating company is responsible for ensuring that the correct accessories are used.
Dynajet GmbH declines all responsibility and liability for damage caused as a result of using non-original accessories or using correct accessories inappropriately.

2.20 Storing the machine

The machine should be stored only in a dry, frost-free location.
If there is a danger of freezing at the storage location, take appropriate antifreeze protection measures.
For further details, refer also to the chapter: ”Decommissioning”.

2.21 Injuries through unauthorised starting or use the machine

During the following operating modes at the machine:

- Starting up
- Operation
- Cleaning, Troubleshooting, Maintenance
- Decommissioning

there is a risk due to unauthorised starting or use of the machine.

Always secure the machine against unauthorised starting before leaving the work area. This means:

- Switch the main switch to OFF.
- Close the hoods.
-

The operator must always have a clear view of the machine. If necessary, the operator will have to appoint a person to monitor the machine.
If unauthorised persons approach the machine, the operator must stop work immediately.

3 General Technical Descripton

This section describes the components and assemblies on this machine and describes how they function. Please note that possible options are also described. Please see the machine card to find out whether a particular option is fitted.

Designation of machine

Your machine is a Dynajet from Dynajet GmbH.
You will make it much easier for us to answer any questions or respond to orders if you can give us the details of the machine model and the machine number.

The rating plate is attached to the frame at the front right, viewed in direction of travel.
The machine number is stamped on the frame at the front right, viewed in direction of travel, and is marked in red.

Dynajet xxx me

- Electric drive
- portable
- XXX bar maximum pressure

3.1 Machine number

The machine number is stamped on the rating plate and marked in red.

3.2 Machine versions

These operating instructions are valid for subsequent versions of the machine.

Model	Type	Material No.
Dynajet 500 me	400V/50Hz	111518020
Dynajet 500 me	400V/50Hz	111518050

The following data can be found on the accompanying machine card and on the rating plate:

- Machine version (voltage and frequency)
- Machine number

Notes

The machine number is allocated by Dynajet GmbH. Each machine number is only allocated once. This means that the machine number identifies each individual machine.

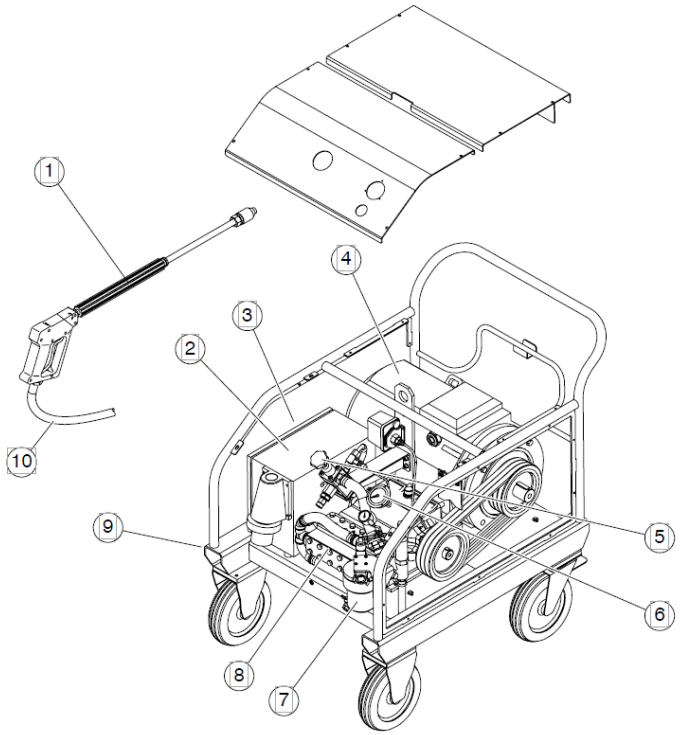
3.3 Scope of supply

The scope of supply includes:

- Dynajet me high-pressure cleaner,
- a 10 m high-pressure hose,
- a high-pressure gun with high-pressure pipe and fan jet nozzle
- accessoires standard,
- Operating Instructions,
- a spare parts list,
- a document folder.

3.4 Summary

Below you will find an overview of the most important components; these will then be described on the following pages.



Item	Designation
1	High-pressure gun with fan jet nozzle
2	Control cabinet
3	EMERGENCY STOP button
4	Drive motor
5	Unloader
6	Pressure gauge
7	Water filter
8	High-pressure water pump
9	Rating plate
10	High-pressure hose

3.5 Technical data

The technical data and features listed below relate to the Dynajet 500 me.

	Dynajet 500me
Dimensions	
Length	1161 mm
Width	800 mm
Height	1095 mm
Weights	
Weight	430,5 kg
Performance data	
Drive motor	Electric motor 30kW
Working pressure	up to 500 bar
Pumping rate	up to 27 l/min

3.6 Water quality requirements

Observing the water quality requirements will extend the life of the high-pressure water pump and ensure it functions correctly.

Pressure-dependent parameters				
Parameter		**Pressure range**		
		max. 500 bar	**>500 bar bis 1200 bar**	**>1200 bar**
Solids concentration	(mg/l)	max. 100	max. 50	max. 10
Particle size	(µm)	max. 80	max. 50	max. 10
Temperature	(°C)	max. 60	max. 50	max. 30
Overall hardness	(mmol/l)	0,5-5	0,5-5	0,5-3,5
(Ca^{2+} + Mg^{2+})	(°d), (°dH)	3-25	3-20	3-15
(Ca^{2+} + Mg^{2+})	(mg/l)	20-200	20-200	20-145

Pressure-independent parameters			
pH value			6,5-8,0
Conductivity		(µS/cm)	max. 2000 at 20°C
Dissolved oxygen		(mg/l)	min. 5
Organic materials		(mg/l)	max. 12
Aluminium	Al	(mg/l)	max. 0,2
Ammonium	NH^{+}	(mg/l)	max. 0,5
Calcium	Ca^{2+}	(mg/l)	max. 100
Chlorine	Cl^{2}	(mg/l)	max. 0,5
Chloride	Cl	(mg/l)	max. 100
Iron	FE^{2}	(mg/l)	max. 0,3
Silicon dioxode	SiO^{2}	(mg/l)	max. 20
Copper	Cu^{2+}	(mg/l)	max. 1
Magnesium	Mg^{2+}	(mg/l)	max. 50
Manganese	Mn^{2+}	(mg/l)	max. 0,1
Sulphate	SO^{2}	(mg/l)	max. 250
Nitrate	NO3	(mg/l)	max. 50
Nitrite	NO^{2}	(mg/l)	max. 0,1

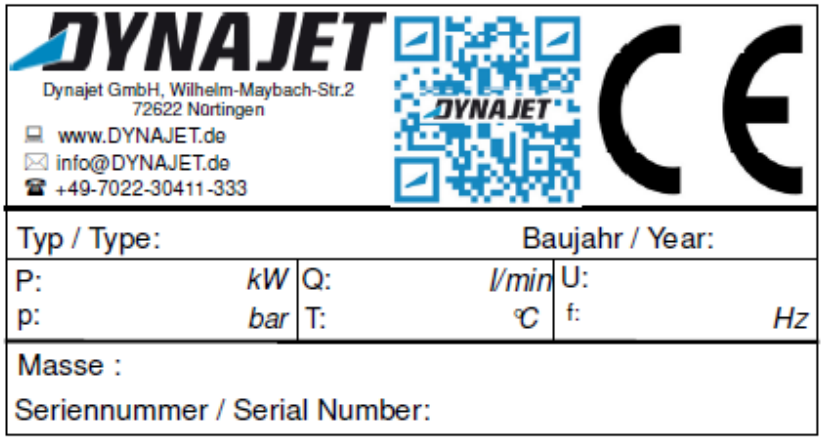
Notes

All other parameters must correspond to standard drinking water values and regulations.

Deviations from the values listed above are only permitted after consulting Dynajet GmbH

3.7 Rating Plate

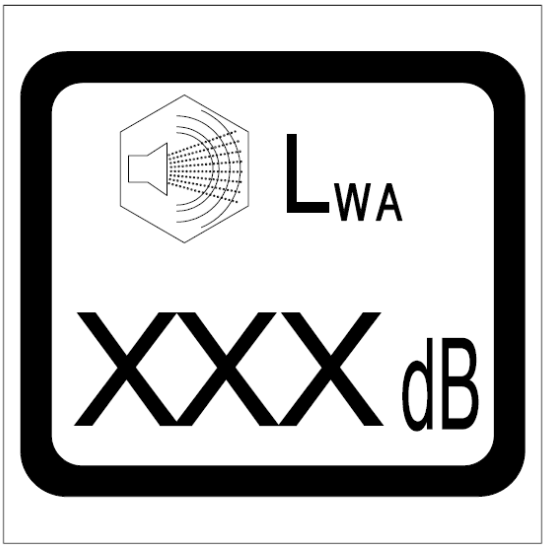
The most important machine data is shown on the rating plate.



Item	Designation
1	Model (machine model)
2	Year of manufacture
3	Maximum delivery pressure [bar]
4	Hydraulic pressure [bar] (maximum fluid pressure in the hydraulic system)
5	Voltage [V]
6	Frequency [Hz]
7	Power [kW]
8	Licence number
9	Chassis number no.
10	Permitted gross weight [kg]
11	Permitted axle load [kg]
12	Maximum permitted drawbar load [kg]
13	Identification number for certification and monitoring office

3.8 Sound power level

In accordance with Directive 2000/14/EC the sound power level emitted by the machine is given below.
Next to the rating plate on the machine there is the plate shown in the picture below which gives the machine's sound power level measurement.



Item	Designation
LWA	Sound power level
dB	Decibel value

3.9 Safety equipement

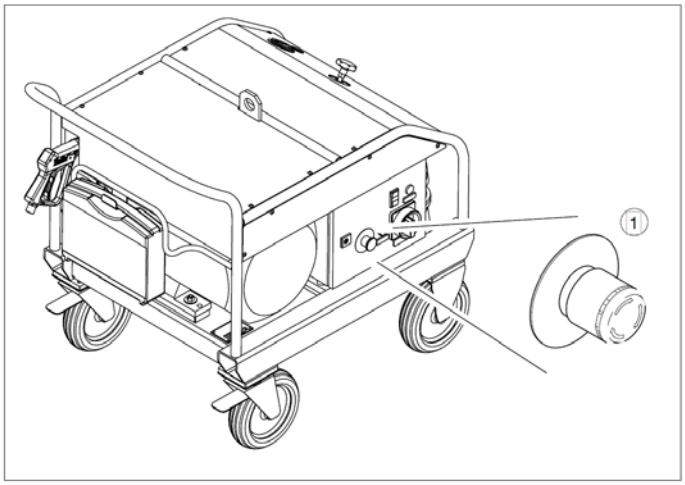
The following is a list of installed safety devices on the machine.

EMERGENCY-STOP button

An EMERGENCY STOP button is fitted to the machine.

Caution

Familiarise yourself with the position of the EMERGENCY STOP buttons on your machine.



Item	Designation
1	EMERGENCY -STOP button on control cabinet

When the EMERGENCY STOP button is pressed, the following activities are tripped:
- The machine switches off.

Note

To cancel the EMERGENCY STOP status, you have to unlock the depressed EMERGENCY STOP button by turning it.

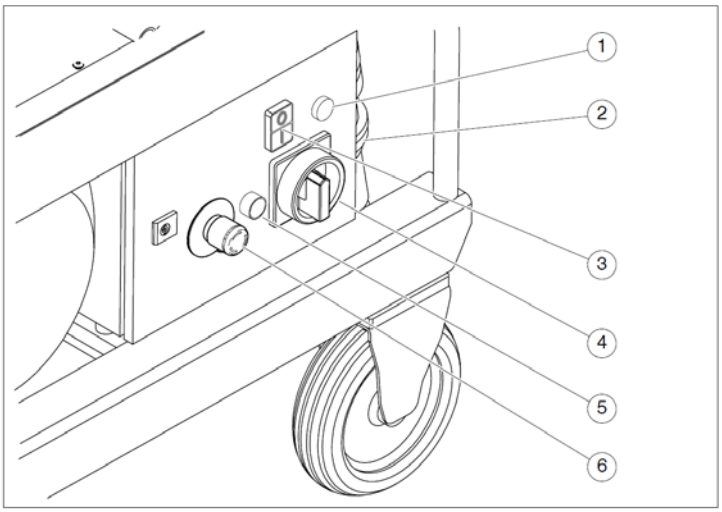
3.10 Control cabinet

The machine is controlled and operated via the control cabinet.

High voltage
Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with electrical engineering rules and regulations.

The control cabinet's wiring, earthing and connections comply with VDE codes of practice.

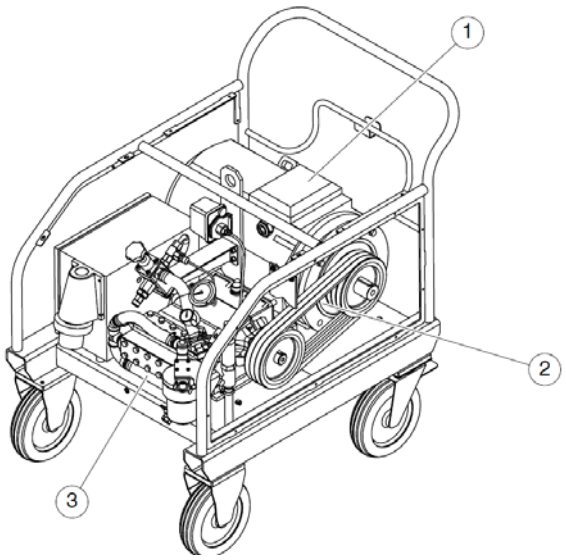
Use only original fuses with the specified current rating. The electrical system can be destroyed by over-rated fuses or bridging.



Item	Designation	Function / display
1	Indicator lamp	Ready for service (current and water pressure present)
2	CEE external device plug	Power supply connection
3	Double pushbutton	Motor ON / OFF
4	Main switch	Power supply ON / OFF
5	Pushbutton	Pressure monitor bypass
6	EMERGENCY-STOP button	Switches off the machine in an emergency

3.11 Drive motor

The drive motor powers the high-pressure water pump via a V-belt.



Item	Designation
1	Drive motor
2	V-belt motor / water pump
3	High-pressure water pump

The drive motor has different connection values, depending on the model. Please refer to the rating plate, the machine card or the ”Electrical connections” section in the chapter ”Transport, setup and connection” for the connection values for your machine.

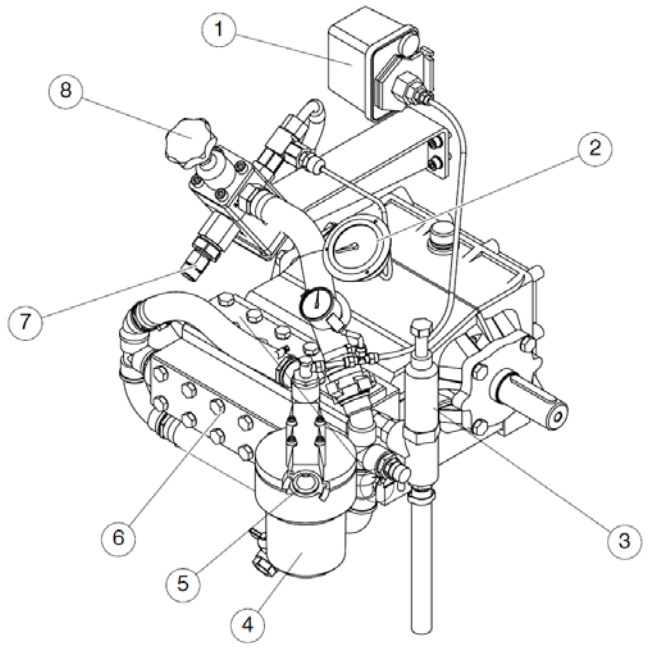
Note

For further information about the drive motor, see the manufacturer’s documentation.

V-belts are subject to increased wear during the first few hours of the initial break-in phase and small quantities of belt material may collect in the area around the V-belt.

3.12 Water system

The high-pressure water pump supplies pressurised water at a maximum of 500 bar:



Item	Designation
1	Pressure switch
2	Pressure gauge
3	Pressure limiting valve with drain hose
4	Water filter
5	Low-pressure hose connection
6	High-pressure water pump
7	High-pressure hose connection
8	Unloader

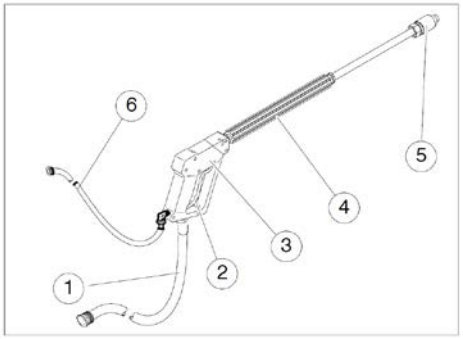
The machine is supplied with water via the low-pressure hose.
The water flows through the water filter so that the water supplied to the high-pressure water pump is clean.
The high-pressure water pump pumps the water into the high-pressure hose at the preset water pressure.

The pressure limiting valve is sealed. It limits the maximum water pressure. Excess water pressure is dumped via the drain hose. Adjust the current water pressure by turning the unloader and view the reading on the pressure gauge. The unloader limits the water pressure, excess water is depressur- ized and runs through the bypass hose back into the water inlet.

3.13 High-pressure gun with fan jet nozzle

The high-pressure gun controls the high-pressure water jet and is connected to the high-pressure hose.

Your high-pressure gun may be fitted with a control line, depending on the model.



Item	Designation
1	High-pressure hose
2	High-pressure gun trigger with safety lock
3	High-pressure gun
4	High-pressure pipe with insulation
5	Fan jet nozzle
6	Control line (depending on the model)

Refer to the chapter: ”General Technical Description” - section: ”Technical data” for information on maximum operating pressures for the high-pressure gun.

When operating the high-pressure gun, always hold firmly with both hands. Place one hand on the high-pressure gun trigger and the other hand on the insulated section of the high-pressure pipe.

Always wear protective equipment when operating the machine, see chapter ”Safety Regulations”.

⚠ Danger

Waterproof protective equipment only provides protection from spray water and splash particles. In the case of direct contact with the high-pressure water jet, protective clothing does not provide sufficient protection from injury.

Trigger safety device

There is a trigger safety device on the high-pressure gun trigger that prevents the high-pressure gun from triggering accidentally. and prevent personnel from actuating the high-pressure gun trigger by mistake.
The design of the trigger lock depends on the gun model.

One version has a red securing lever that flips back and locks in place to prevent personnel from actuating the gun trigger by mistake.

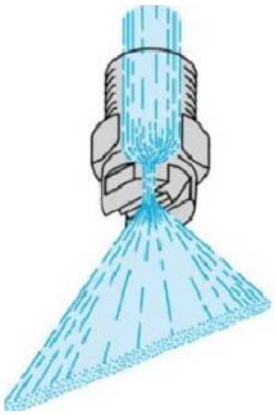
Second version.
The safety device engages automatically when the high-pressure gun is closed and prevents personnel from actuating the
high-pressure gun trigger by mistake. Press the securing lever up- wards and then the trigger to actuate the high-pressure gun.

Control line

Before working with the high-pressure gun, connect this nozzle to the machine via the control line. Attach the control line to the connection sockets on the control cabinet and the high-pressure gun. If the control line is not connected correctly, pressure does not build in the machine. A fault message appears on the control cabinet display.

Fan jet nozzle

The high-pressure gun, high-pressure hose and fan jet nozzle must be assembled prior to operation.
Fan jet nozzles are characterised by a uniform liquid and pressure distribution. The flow geometry of the nozzles creates a compact, controlled jet. They can be used universally and are not sensitive to pressure fluctuations.



Refer to chapter: ”General Technical Description” - paragraph: ”Technical data” for data relating to the fan jet nozzle included in the scope of supply.

Note

Bear in mind that the nozzles have an influence on the water pressure. Incorrect water pressure may accelerate wear on the high-pressure cleaner.

If the nozzle used is too small, the pressure may increase, which could trigger the overpressure safety device in the high-pressure circuit and limit the system pressure.

If the nozzle used is too large, the high-pressure water pump may not be able to attain maximum pressure at the full output.

The working pressure decreases as the nozzle wears.

Always keep a sufficient number of replacement nozzles in stock.

4 Transport, Set-up and Connection

In this section you will find information concerning safe transport of the machine. Furthermore, work is described in this section, which is also necessary for the installation and connection of the machine. Starting up the machine will not be described until the chapter ”Starting up”.

Unpacking the machine

Before shipment, the machine is packaged for transportation. Un- pack the machine and dispose of the packaging material.

Environmental protection

Recyclable materials are used for packaging the machine. Dispose of the packing material in compliance with the nationally valid environmental protection regulations.

4.1 Transporting the machine

The machine does not have any attachment points and should therefore loaded onto a suitable transport aid (euro pallet). Use a suitable crane with lifting gear or a fork-lift truck to lift the machine.

⚠ Danger of crushing

Lift the machine carefully with a fork-lift truck and move with great care. When lifting with the crane, determine the centre of gravity of the machine by lifting carefully. All cables or chains on the lifting gear must be tensioned evenly and the machine must be raised evenly at all support points.

⚠ Suspended Load

Ensure no persons are under a suspended load.

4.2 Selecting the set-up site

The set-up site of the machine is usually determined and appropriately prepared by the site management.

Notes

The responsibility for setting up the machine safely falls on the operator.

4.3 Set-up site requirements

Inspect the proposed site carefully and reject the set-up site if you have any doubts in respect of safety.

- The loadbearing capacity of the supporting ground must be suffi- cient to withstand the weight of the machine.
- The supporting ground must be horizontal and even.

⚠ Danger

Keep a safe distance away from pits and slopes. Never prop up the machine.
Continually check the stability of the machine during operation.

► Move the machine to its operating position (horizontal).

Achtung

The machine should only be operated in a horizontal position.

A tilt switch monitors the position of the machine and makes sure that the machine can only be operated in a horizontal position.
Maximum inclination angle: 10°

4.4 Setting up

The machine must be set up so that it is absolutely stable and secured against rolling.

► Secure the machine against rolling by applying the foot brake.

► Align the machine horizontally. Observe the permitted inclination angles.

Foot brake

Foot brakes are attached to the wheels to secure the machine against rolling.

Caution

Always apply the foot brake firmly to prevent it from releasing unexpectedly!

Raise the lever with your foot to release the foot brake.

Notes

Always remember to release the foot brake before moving the machine.

Inclination angles

Observe the maximum inclination angles during machine set-up and operation.

Refer also to chapter: ”General Technical Description” - section ”Technical data” for the maximum permitted inclination angles.

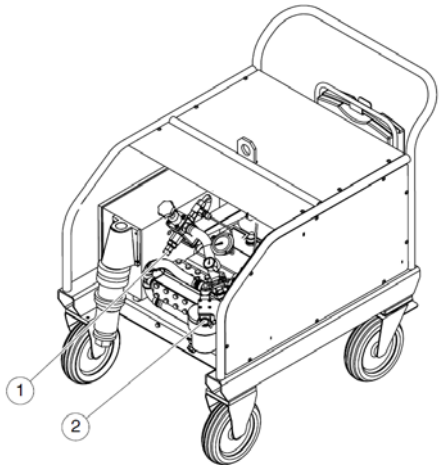
⚠ Danger

Lubrication is no longer guaranteed at excessive inclination angles. These conditions will lead to increased wear or machine damage.

Do not operate the machine at inclination angles greater than those specified!

4.5 Water connections

The following section describes how to connect the high-pressure cleaner to the water supply.



Item	Designation
1	Connection for the high-pressure hose
2	Connecting to the mains water supply

The water supply may only be connected as per DIN 1988 - Technical Rules for Water Installations, i.e. by means of installation type 1 backflow preventers or an independent outlet (buffer tank with a booster pump).

Please ensure that you check preconditions for connection to the water supply before beginning connection work.

- The pipe must be at least 3/4” in diameter.
- The available water pressure must be at least 2 bar.
-

Water pipes must be laid visibly, taking local conditions into consideration, and protected against damage. They must not be allowed to obstruct operating personnel.

Caution

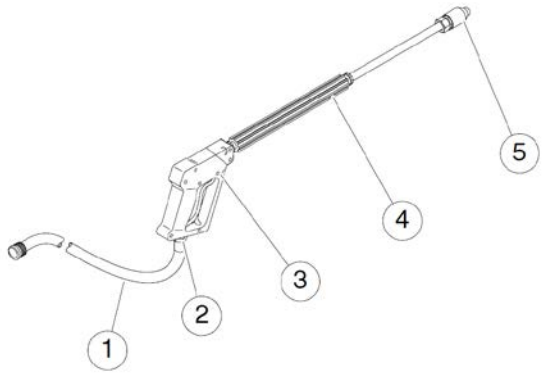
The water used must be clean and of drinking water quality. The maximum water temperature is 60 oC.
Never use: salt water, sea water, completely desalted water or water with added chemicals.
Only add chemicals or cleaning agents on consultation with Dynajet GmbH.

Caution

If there is a risk of freezing, the pipes must be laid so as to exclude the possibility of the water freezing

► Roll out the required length of water hose from the hose holder and attach it to the water connection (2).

► Roll out the high-pressure hose and connect it to the high-pressure connection (1).



Item	Designation
1	High-pressure hose
2	Threaded coupling
3	High-pressure gun
4	High-pressure pipe with insulation
5	Fan jet nozzle

► Attach the high-pressure pipe with insulation (4) and fan jet nozzle (5) to the high-pressure gun (3).
► Connect the high-pressure gun (3) and the high-pressure hose (1) to the threaded coupling (2).

4.6 Electrical connection

Please also refer to the ”General Technical Description” or the electrical circuit diagram for the electrical connection values.

Refer also to chapter: ”General Technical Description” - section: ”Technical data” and “rating plate” for more details.

Heavy current
Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with electrical engineering rules and regulations.

The electrical connection must be made on the basis of the electrical circuit diagram supplied.

The electrical circuit diagram can be found in the machine spare parts list.

Caution

Do not turn the main switch on at this stage.
The main switch must remain locked until the entire system has been completely assembled.

Prerequisites

Electrical installation prerequisites should be checked by a qualified electrician before connection work begins.

- The connected load of the existing electrical installation must be sufficient for the machine.
- Please refer to the technical data for the maximum back-up fuse values.
- The installation should always be connected to a special feed point.
- All 3 phases and the PE (Potential Earth) protective conductor must be present.

Laying electrical supply cables

Supply cables must be laid visibly, taking local conditions into consi- deration, and secured against damage.

⚠ Danger

There is a danger of electric shock which may have lethal consequences by:
– contact with electrical cables;
– contact with machines with electrical drives, if the electrical connection has not been properly made or the supply cable is damaged.

Connection tot he mains power supply

The machine must be connected to a separate feed point at the con- struction site.

The following power sources are permissible as a special feed point:

- Site power distribution point
- Small site power distribution point
- Protective distributor
- Movable protective device

The machine is electrically ready for service once the mains plug is plugged into a power source.

5 Startingup

In this chapter you will find information on starting up the machine. The work steps for initial operation of the machine are described as well as how to prepare the machine for operation after a long break. There is also a description on how to check the condition of your machine and how to carry out a test run with function checks.

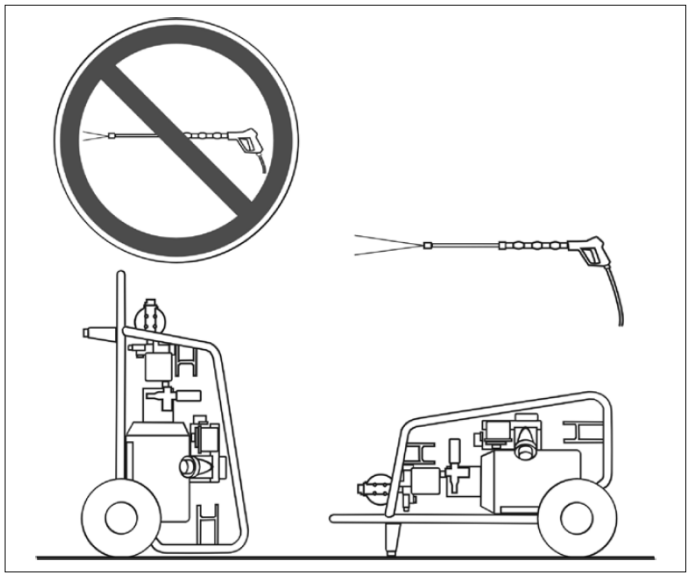
Notes

The operating personnel should be trained on the machine during initial operation.

Every time the machine is in operation, the operator accepts full responsibility for the safety of anyone located in the machine's danger zone. He is therefore obliged to ensure absolute operating safety of the machine.
The operator must familiarise himself with the machine during machine handover.
This means:
He must have read and understood the Operating Instructions (especially the chapter on Safety Regulations).
He must be in a position to carry out the correct measures in case of emergency and switch off and secure the machine.

The entire system must be observed during the initial hours of operation to identify possible malfunctions.

5.1 Working position of the machine



Caution

The machine should only be operated in a horizontal position.

A tilt switch monitors the position of the machine and makes sure that the machine can only be operated in a horizontal position.
Maximum inclination angle: 10°

5.2 Checks

Each time the machine is used at a construction site, you should check the condition of your machine and carry out a test run inclu- ding function checks. If you identify any faults during the checks, you must eliminate these (or have these eliminated) immediately.

Visual checks

Some important visual checks should be carried out before starting up the machine.

►Always check the machine thoroughly for apparent defects before starting work.

► Check that the water supply is connected to the machine correctly.

► Check that the high-pressure pipe, fan jet nozzle and high-pressure hose are fitted to the high-pressure gun correctly.

► Check the high-pressure hose for damage.

► Check the water filter for contamination.

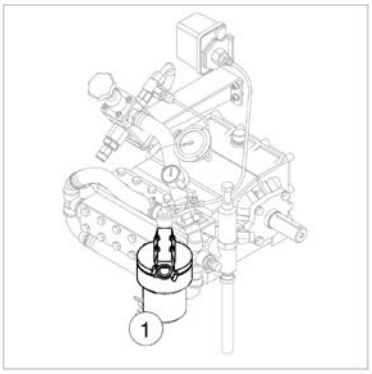
► Check that all safety equipment is in place and is fully operational.

Water filter

A contaminated water filter may result in damage to the high-pressure water pump. The filter system cleans the supplied water, thus safe- guarding the high-pressure water pump.

Caution

Use only clean mains water.



Item	Designation
1	Water filter

If the water filter is contaminated, the integral water deficiency monitor switches the machine off or prevents the machine from being started.
The filter element changes colour when dirty.
Replace the filter element on the water filter should discolouration occur.

⚠ Environmental protection

Observe all applicable local waste disposal regulations when changing the filter.

5.2.1.1 Electrical connection

Using faulty electrical components or connecting components incorrectly may result in serious injury (possible fatal) or severe damage to the machine.

► Always check all electrical components carefully for apparent defects before starting work.

► Check whether the required power supply is available.

5.3 Function checks

Before using the machine, the following functions should be checked with the machine running.

Water filter

A contaminated filter can result in damage to the high-pressure water pump.
The filter system cleans the supplied water, thus safeguarding the high-pressure water pump.

The filter element from the water filter must be replaced if it becomes soiled.
The filter element changes colour when it becomes soiled.
The installed water shortage safety device switches off the machine when the water filter is blocked.
A blocked filter can result in damage to the high-pressure water pump.

Caution

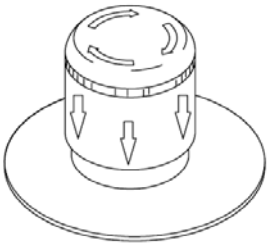
Use only clean mains water with a maximum temperature of 60 °C. Do not use saline (sea) water under any circumstances.

⚠ Environmental protection

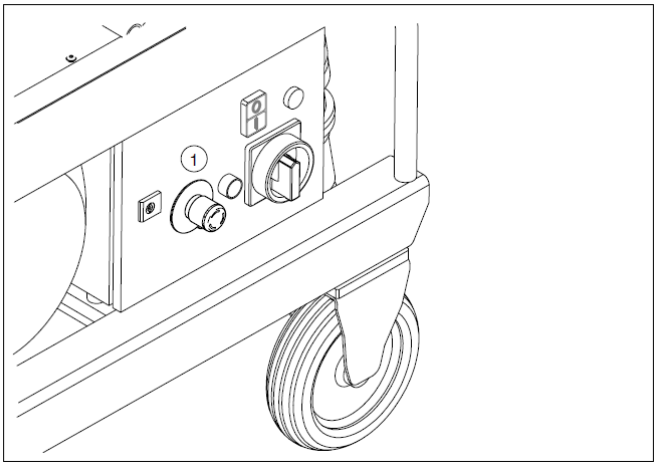
When changing filters, observe the waste disposal regulations that apply to your region.

Function check of EMERGENCY-STOP button

Check the operability of the EMERGENCY STOP button.



Press: lock EMERGENCY STOP
Rotate: unlock EMERGENCY STOP



Item	Designation
1	EMERGENCY STOP button

► Start the engine as shown in the chapter Starting the engine.

► Press the EMERGENCY STOP button.

=>The machine switches off.

► Unlock the EMERGENCY STOP button by turning it.

Caution

The machine is no longer safe to operate if the EMERGENCY STOP button is defective, as you will no longer be able to switch off the machine quickly enough if danger threatens.

If the EMERGENCY-STOP button does not respond during the check, the machine must not be started up.

You must therefore check the functioning of the EMERGENCY-STOP button each time you start work.

5.4 Shutting down machine after initial operation

After the function check, you can shut down the machine.

►Switch the main switch to OFF.

►Press the high-pressure gun lever to relieve the pressure.
=>The residual pressure in the hose and high-pressure gun is relieved.

► Secure the machine against unauthorised starting or use.

6 Operation

In this section you will find information on machine operation. You will learn what operations are required for setting up the machine, operation and for cleaning.

Requirements

Before starting work, you must carefully carry out the working steps for commissioning and installing the machine.

Notes

If a malfunction occurs during the working process, refer to the Section ”Faults, causes and remedies” first. If you are unable to rectify the fault yourself, consult a dealer authorised by Dynajet GmbH.

6.1 Setting values

The setting values depend on the tasks being carried out.

Notes

There are specific setting values for every type of cleaning task to help achieve the best cleaning results. Contact Dynajet GmbH for advice on the correct setting values for your specific cleaning needs.

Cleaning surfaces

Do not direct the cleaning jet vertically onto the surfaces to be cleaned. Try to ”peel off” the dirt layer from the surfaces.

6.2 High-pressure cleaning

For cleaning work, proceed as follows:

⚠ Danger

Wear all necessary protective equipment. This also applies for all personnel standing within the operating area of the machine (for their own safety).

Never direct the water jet at people or animals.

Pay attention to the confines of the danger area when performing work involving high-pressure water jets. No personnel apart from the machine operator should stand within a 10 m radius of the high-pressure gun.

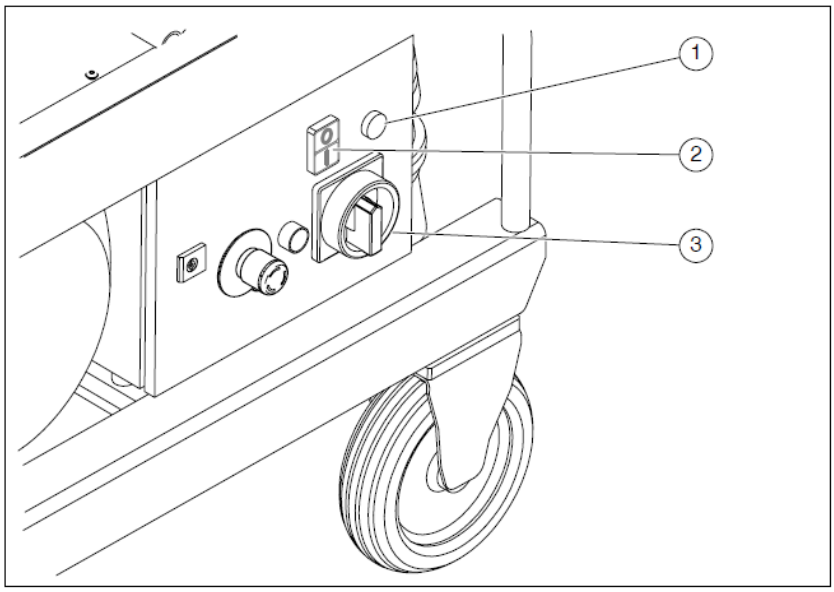
When operating the high-pressure gun, always hold firmly with both hands. Place one hand on the high-pressure gun trigger and the other hand on the insulated section of the high-pressure pipe.

The high-pressure gun produces recoil and torque when activated. Ensure equipment is secure and stable.

Do not crush high-pressure hoses or guide them over sharp edges. Avoid tensile and bending stress.

Starting the drive motor

The drive motor is switched on by pressing the double pushbutton.



Item	Designation
1	Indicator lamp
2	Double pushbutton
3	Main switch

► Switch on the main switch (3).

=>The indicator lamp (1) lights up

► Switch on the drive motor using the double pushbutton (2).

Caution

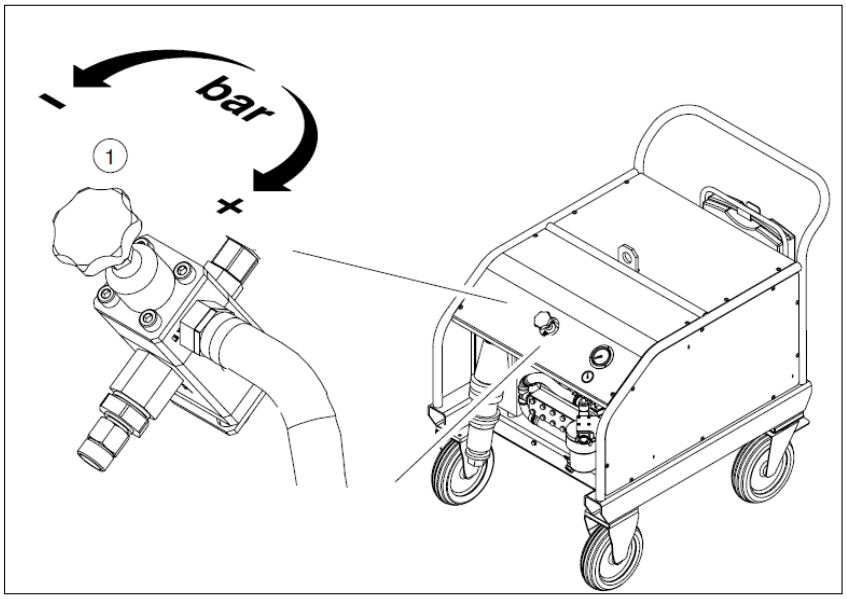
The delivery side must be fully open when the drive motor is switched on, i.e. press the high-pressure gun trigger.
This fills the pump more quickly and avoids dry runs.

Adjusting the working pressure

You can adjust the working pressure by turning the unloader.

Note

There is no motor speed adjustment feature on the drive motor. The engine speed is controlled depending on the load.



Item	Designation
1	Unloader

► Turn the unloader (1) clockwise to increase the working pressure.

► Turn the unloader (1) anticlockwise to decrease the working pressure.

6.5 Operating the heating module (optional)

The high-pressure cleaner is designed for operation with hot water that reaches a max. temperature of 95 °C. A heating module (not included in the scope of supply) must be integrated in the system. Read the ”Heating module” section in the chapter ”General technical description”.

⚠ Danger

The high-pressure hose, the high-pressure gun and the pressurised water pose a risk of burns and scalding.
Perform any work extremely carefully while a heating module is connected.

Notes

Read the documentation accompanying the heating module.
Consult the Dynajet GmbH After Sales department.

6.3 Cleaning the machine

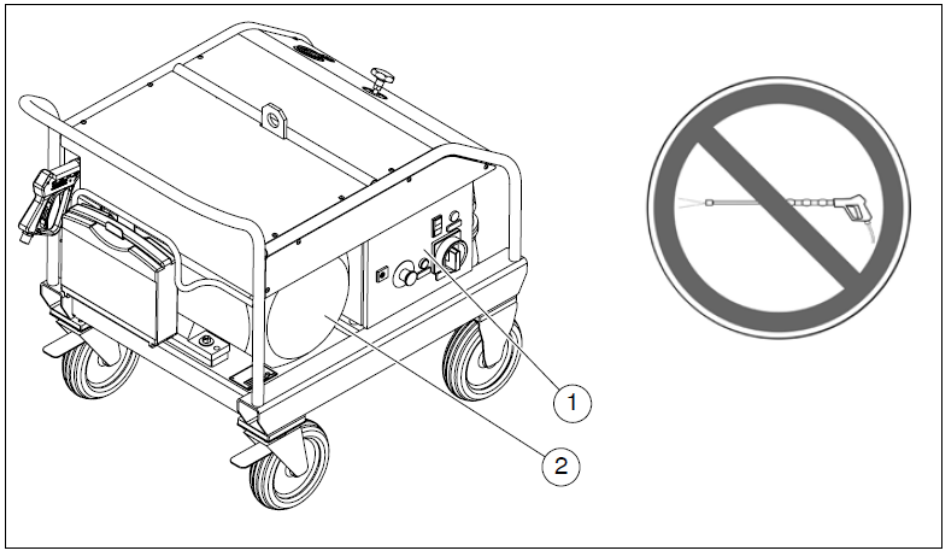
After completing your work, clean the machine, the high-pressure gun and the high-pressure hose. This ensures that the machine will function correctly the next time it is used.

Information on cleaning

Note

In the first four operating weeks clean all painted surfaces with cold water with a maximum water pressure of 5 bar only. Do not use any aggressive cleaning additives. Only after this time will the paint have hardened completely, allowing you to use steam jet equipment or similar tools.

Under no circumstances use sea water or any other salty water for cleaning purposes. Should sea water get onto the machine you must rinse it off without fail.



Item	Designation
1	Control cabinet
2	Engine

Caution

Do not clean the control cabinet or the engine with pressurised water. Cover all openings prior to cleaning. For safety or operating reasons, moisture must not be allowed to enter these openings.

⚠ Environmental protection

Observe all applicable local waste disposal regulations when performing cleaning work.

►Remove all covers after cleaning!

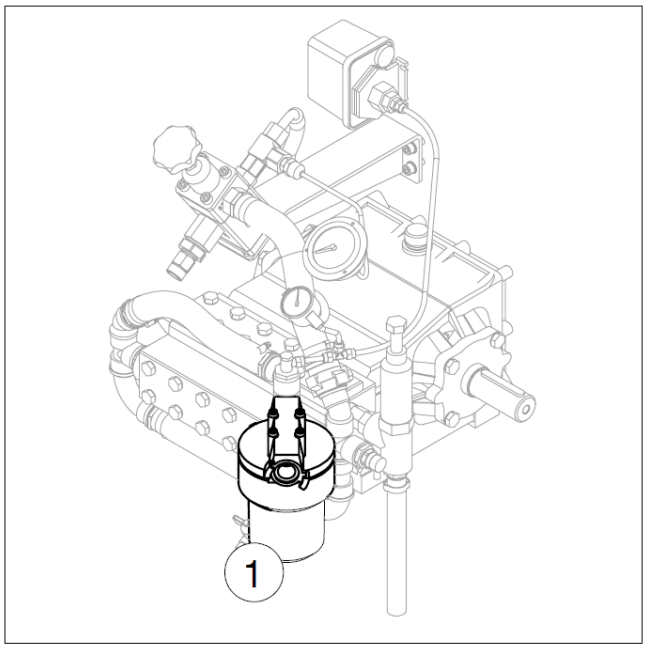
►Clean the low-pressure hose and the high-pressure hose with a suitable cleaning cloth and wind up the hoses.

►Clean the high-pressure gun with a suitable cleaning cloth. The high-pressure gun trigger must be easy to operate.

Water filter

The amount of dirt on the water filter depends on the water quality. The filter element changes colour when dirty. Clean or replace the filter element if it changes in colour or the maintenance intervals have been reached. Read the ”Maintenance intervals” section in the chapter ”Maintenance”.

► Completely drain the water from the hoses.



Item	Desigantion
1	Water filter

► Unscrew the water filter (1).

►Unscrew the union nut on the water filter (1) and remove the filter casing and filter element.

►Clean the water filter (1).

►Replace the cleaned or new water filter (1).

Note
Ensure that the gasket is correctly seated.

7 Faults, Cause and Remedy

This section gives you a summary of faults and their possible causes, and also ways in which you may rectify them. Observe the safety regulations when troubleshooting.

Heavy current

Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed personnel under the supervision and guidance of a qualified electrician and in accordance with electrical engineering rules and regulations.

7.1 Machine, general

The following section provides a description of possible causes of faults and their remedies.

The operating pressure fluctuates	
Cause	**Remedy**
The water filter is contaminated.	Clean or replace the water filter.
The fan jet nozzle is blocked or worn.	Clean or replace the fan jet nozzle.

The operating pressure is too low	
Cause	**Remedy**
The fan jet nozzle is too large.	Use a smaller fan jet nozzle.

The seal on the water pump is worn.	Replace the pump seal.
The pump valves are dirty or have seized.	Consult the Dynajet GmbH After Sales department.

The operating pressure is too high (pressure limiting valve or unloader is activated)	
Cause	**Remedy**
The fan jet nozzle is too small.	Use a larger fan jet nozzle.
The fan jet nozzle is dirty.	Clean the fan jet nozzle.

7.2 Electrical system

The following is a description of possible causes of faults, which affect the electrical system, and their remedies.

Heavy current
Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with the electrical engineering rules and regulations.

The drive motor does not start correctly	
Cause	**Remedy**
The drive motor does not run in three phases.	Check the electric lead.
The fuse on the machine is too small.	Use the correct fuse.

The main switch does not click into place and returns to zero position	
Cause	**Remedy**
The pressure of the water supply is too low.	Use a different water supply or connect up a booster pump.
The tilt switch has triggered.	Align the machine horizontally.
The water filter is contaminated.	Clean or replace the water filter.
The fuse on the machine has triggered.	Read the ”The fuse has triggered” section in this chapter.
The motor protection switch has triggered.	Read the ”The motor protection switch has triggered” section in this chapter.

The fuse has triggered	
Cause	**Remedy**
The fuse on the machine is too small.	Use the correct fuse.
The fuse triggers too readily.	Use the correct fuse.
The diameter of the electric supply lead is too narrow.	Use a supply lead with a larger diameter.

The motor protection switch has triggered	
Cause	**Remedy**
The diameter of the electric supply lead is too narrow.	Use a supply lead with a larger diameter.
The electric supply lead is wound up, e.g. on a cable drum.	Unwind the supply lead.
The electrical connection is not compatible with the mains frequency.	Compare the mains frequency with the machine frequency specified on the rating plate. The two frequencies must correspond.
Ventilation for the drive motor is insufficient.	Position the machine so that sufficient air circulates around the drive motor.

8 Maintenance

In this section you will find information on the maintenance work ne- cessary for the safe and efficient operation of the machine.

We would like to emphasise here that all specified checks, inspections and preventive maintenance work must be conscientiously carried out. Otherwise we will refuse any liability or warranty claim. Our After Sales department is available to you with advice and help at any time should you be in doubt.

8.1 Maintenance intervals

The following table shows the intervals for the various maintenance tasks.

Caution

Inspection and maintenance personnel must have authorisation and the necessary technical qualification. They must have completed training relevant to working with the equipment on the machine and be conversant with the content of the operating instructions.

Note

For the maintenance work intervals and performance, please also refer to the documentation provided by:
=>the engine manufacturer
=>the high-pressure water pump manufacturer.

Use only original spare parts.
Dynajet GmbH accepts no liability for damage caused as a result of using non-original spare parts.

For maintenance work, consult a Dynajet GmbH service engineer, or by a dealer authorised by Dynajet GmbH as shown in the Service reference in the table.

Have the initial after-sales service carried out by a Dynajet GmbH service engineer, or by a dealer authorised by Dynajet GmbH.

Criteria	Check ✓	Adjust ■	Replace ⇔	Clean ◆

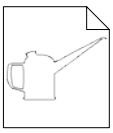
Reference	Section												MC
Description	Section contains a more detailed description									Maintenance work that should be performed by a service technician authorised by Dynajet			Maintenance chart
Action	daily	once after 50 h	every 50 h	every 100 h	every 150 h	every 300 h	every 400 h	every 500 h	every 1000 h	annually	every 2 years	other intervals	Reference
General machine													
Visual inspection: defects and leaks, rectify defects, seal leaks	✓												
Check that the fastening bolts are seated correctly		✓								✓			Section: General tightening torques
Electrical cabling: visual inspection, have repaired if necessary	✓	✓											
Have a qualified expert check for defects										✓			Service
Operational safety check (German Accident Prevention Regulation)										✓			Service
Safety equipment													
EMERGENCY STOP button fully functional, have repaired if necessary (if optional EMERGENCY STOP fitted)	✓												Section: Function check of the EMERGENCY STOP button
Safety devices fitted and fully functional, replace if necessary	✓												Section: Safety equipment
Protective guards fitted, secured and fully functional, replace if necessary	✓												

Action	daily	once after 50 h	every 50 h	every 100 h	every 150 h	every 300 h	every 400 h	every 500 h	every 1000 h	annually	every 2 years	other intervals	Reference
Water system													
Take antifreeze protection measures												✓ if there is a danger of freezing	MC 44-109
Check the water filter and clean if necessary	✓												MC 44-129
Replace water filter, filter cartridge												⇔ 200 h	MC 44-129
Check high-pressure water pump oil level, top up if necessary	✓												MC 52-015
Check the condition of the oil in the high-pressure water pump and change if necessary	✓												MC 52-015
High-pressure water pump oil change		⇔				⇔				⇔			MC 52-015
Check the V-belt tension on the high-pressure water pump, tighten if necessary									⇔			✓ 200 h	Service
High-pressure water pump valves						◆							Service
Check amount leaking from pump seal, have repaired if necessary	✓							✓					MC 44-130
Major overhaul of high-pressure water pump										✓		■ 12000 h	Service

Action	daily	once after 50 h	every 50 h	every 100 h	every 150 h	every 300 h	every 400 h	every 500 h	every 1000 h	annually	every 2 years	other intervals	Reference
Water system													
Check the float valves, have repaired if necessary												✓ 200 h	Service
Check the relief valve, have repaired if necessary												✓ 200 h	Service
High-pressure gun: check the condition, function and suitability, replace if necessary	✓												Section: High-pressure gun
Fan jet nozzle	✓											◆ 200h	
High-pressure hose: visual inspection for ageing, leaks and damage, if necessary, mark as unus- able and replace	✓											⇔ 6 years	Section: High-pressure hoses
Visual inspection: check connection for damage and leaks, rectify defects, repair any leaks	✓	✓											

8.1.1 Protection against frost 44-151

This maintenance card describes how the machine is protected against frost.
The maintenance intervals can be found in the maintenance overview at the start of this chapter.



See also the maintenance cards:
General maintenance work

Caution

Always perform the frost protection measures because freezing could result in bursting of the high pressure water pump, the water filter and the pipelines.

Observe the frost protection instructions when preparing the antifreeze mixture. Always prepare antifreeze mixture with the required mixing ratio.

If antifreeze mixture is poured directly into the water tank, the water filter is bypassed. Please ensure that no dirt or impurities can enter the water tank, otherwise the high pressure pump could be damaged.

⚠ Environmental protection

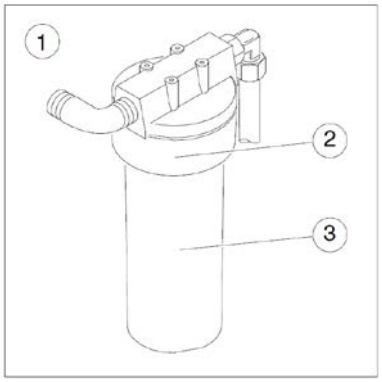
Carefully capture any escaping antifreeze mixture and keep it separate from other waste.
Dispose of everything according to regulations.
When using antifreeze mixture adhere to the waste disposal regulations applicable for your region.

Draining the machine

To protect against frost the machine must first be drained.

► Disconnect the machine from the water supply.

► Position the machine horizontally. Drain the water filter as follows:



Different versions are possible

Item	Description
1	Water filter
2	Union nut
3	Filter housing with filter cartridge

► Unscrew the water filter union nut.

► Pull the filter housing off and empty it.

► Allow the residual water to drain completely from the water pipe.

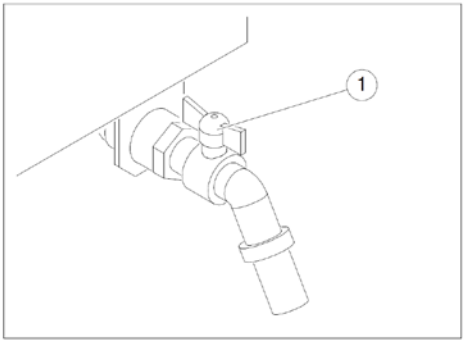
Note

Check that the filter cartridge, filter housing and seals are correctly seated.

► Fit the filter housing again.

► Tightly screw the water filter union nut back on.

Drain the water tank as follows:



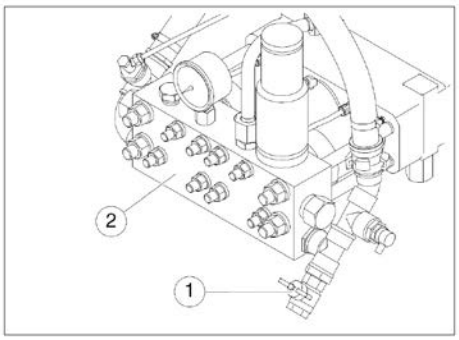
Different versions are possible

Item	Description
1	Water tank drain cock

► Open the water tank drain cock (1) and allow the water to drain out.

► Reclose the drain cock.

Drain the high-pressure circuit as follows:



Different versions are possible

Item	Description
1	Drain cock
2	High-pressure pump

► Open the water tank drain cock (1) and allow the water to drain out.

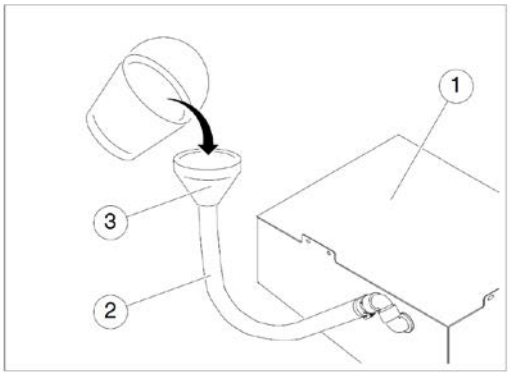
► Reclose the drain cock.

Protecting the machine against frost

Proceed as follows to protect the machine against frost:

► Close the water tank drain cock.

► Mount the high-pressure gun without the flat jet nozzle and connect it up.



Item	Description
1	Water tank
2	Overflow hose
3	Funnel with sieve insert

► Raise the overflow hose at the water tank and insert a sieve containing funnel into it.

► Pour a sufficient amount of antifreeze mixture (concentration as required) into the empty water tank.

► Start the drive motor. See also chapter: "Initial operation" - Section: "Starting-up".

► Allow the machine to run for about 3 minutes in circulating mode.
=>The bypass is filled with antifreeze mixture.

► Hold the high-pressure gun over a bucket and press the high-pressure gun lever.
=>The antifreeze mixture spreads uniformly throughout the entire water system.

► Keep the high-pressure gun lever depressed until antifreeze mixture comes out of the gun.

=>Release the high-pressure gun lever.

Note
This action ensures that the entire high-pressure section is flooded with antifreeze mixture.

► Switch the machine off. See also chapter: "Initial operation" - Section: "Shutting down machine after initial operation".

► Press the high-pressure gun lever to release the pressure.
The residual pressure in the line and the high-pressure gun reduces to atmosphere.

► Uncouple the high-pressure hose line and hang it up to drain.

► Disconnect the high-pressure gun. Allow the water to drain out by holding the high-pressure gun vertically. Press the high-pressure gun lever while doing so.

► Dispose of escaped antifreeze mixture according to regulations.

Restarting the frost-protected machine

To restart the frost-protected machine, proceed as follows:

► Drain the machine. See also section: "Draining the machine".
=>The antifreeze mixture in the water system drains off.

► Mount the high-pressure gun without the flat jet nozzle and connect it up.

► Open the drain cock of the water tank for 10 to 15 seconds.

► Connect the low-pressure hose.

► Start the drive motor. See also chapter: "Initial operation" - Section: "Starting-up".

► Hold the high-pressure gun over a bucket and press the high-pressure gun lever.
=>The water valve is purged.

► Keep the high-pressure gun lever depressed until no more antifreeze mixture comes out of the gun.

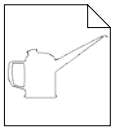
► Dispose of escaped antifreeze mixture according to regulations.

Note
Minimal antifreeze residues in the pipes can, even after considerable machine operating time, still result in discoloration of or foam formation in the water. However this has no effect on the service life or the wear behaviour of the high pressure pump.

► Switch the machine off. See also chapter: "Initial operation" - Section: "Shutting down machine after initial operation".

8.1.2 Belt tensioning, high pressure water pump 44-152

This maintenance card describes checking of the belt with which the high-pressure pump is driven.
The maintenance intervals can be found in the maintenance overview at the start of this chapter.



See also the maintenance cards:
General maintenance work

The following special tool is necessary:
Frequency measurement instrument (Dynajet Art. No. 466768)

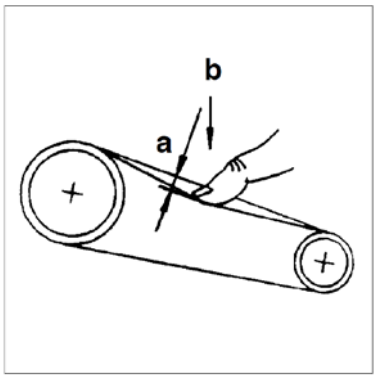
⚠ Danger

Only perform maintenance work when the machine is cold.

Caution

Maintenance must only be performed by authorised personnel with special knowledge and experience.

Checking the belt tension



Belt tension	a	B
Retension	9 mm	75 N
New belt	8 mm	75 N

► Check the belt tension by pressing with the thumb. The belt must be retensioned if it can be pressed in more than the specified amount.

► If necessary, the belt must be retensioned.

Note

Contact the responsible service department at Dynajet GmbH.

When using the frequency measuring instrument, the following values apply:

Belt tension	Frequency measuring instrument
Retension	79.5 Hz
New belt	90.6 Hz

8.3 Operating materials

This section lists all the operating materials used in your machine.

High-pressure water pump Dynajet 500 me	SAE 30 W filling capacity about 2,59 l

⚠ Environmental protection

You must carefully collect all operating materials, e.g. used oil, filters and auxiliary materials and dispose of them separately from other waste. Observe the national and regional regulations applicable to your area. Only work with waste disposal companies who are approved by the responsible authorities.

8.2 Notes on maintenance

This measure is necessary for all machines connected to the mains.

Heavy current

Work on the electrical system and equipment of the machine must be carried out by a qualified electrician or by instructed persons under the supervision and guidance of a qualified electrician and in accordance with the electrical engineering rules and regulations.

⚠ Danger

During initial maintenance, all cable connections pertaining to the control cabinet (clips, connectors etc.) must be checked and retightened in accordance with the electrical engineering rules and regulations. Otherwise, correct electrical contact cannot be guaranteed, and there is a risk of short-circuit and fire!

9 Decommissioning

This chapter contains information on decommissioning the machine.

7.1 Temporary decommissioning

If the machine is to be shut down temporarily, take the following measures.

► Switch off the machine.

► Cut off the water supply.

► Actuate the high-pressure gun until water no longer escapes and the machine is depressurised.

Frost protection

The machine must be drained fully of residual water if there is a risk of freezing.

Maintenance chart: Antifreeze protection measures

9.1 Decommissioning

If the machine is to be taken out of service temporarily, the following measures must be carried out.

► Carry out work for temporary decommissioning.

► Before storing the machine, top it up with all the service fluids and grease it at the lubrication points.

► Read the documentation provided by the engine manufacturer.

► Protect the machine with a suitable agent.

Notes

Preservation and greasing of the machine will protect it against corrosion and rapid ageing. It is necessary, if the machine:
– is not used for longer periods;
– is exposed to corrosive atmospheres during storage or transportation.

Location

The machine should only be stored in a dry, clean and well ventilated area.

⚠ Danger

There is a risk of fuel vapours building up and igniting if the machine is stored in a poorly ventilated area.

Storing the machine

Observe the following when placing the high-pressure cleaner in storage:

► Store the machine in a dry, frost-free location.

► Place the high-pressure cleaner in a horizontal position if you intend to store it for longer periods.

► If the high-pressure cleaner is to be stored for a long time you

must remove the battery and charge it regularly.

► If there is a danger of freezing at the storage location, take appropriate
protection measures.

Maintenance chart: *Antifreeze protection measures*

Caution

Always implement antifreeze protection measures because freezing temperatures may damage the water tank, the pressurised water pump and cause the hoses to burst.

9.2 Final decommissioning, disposal

The final decommissioning and disposal requires complete disassembly of the machine into its individual components.
When disposing of all machine components, ensure that there is no possibility of damage to health or the environment.

Environmental protection

Commission a qualified specialised company with final disposal of the machine.

⚠ Danger

During final decommissioning of the machine, escaping lubricants, solvents, preserving agents etc. represent a hazard.
They can cause chemical burns in the event of direct skin contact.
Risk of injury on sharp-edged machine components.

Material used

The main materials used for machine construction were:

Material	Use for / in
Copper	- Cables
Steel	- Mashine frame
	- Pump units
Plastic, rubber, PVC	- Gaskets
	- Hoses
	- Cables
	- Wheels
Tin	- PCBs
Polyester	- PCBs

Parts requiring separate disposal

The following components and working materials must be separated prior to disposal:

Designation	Applies to...
Electronic scrap	- Electrical supply
	- PSBs with electrical components
Oil	- Drive motor (D-version)
	- High-pressure water pump

10 Appendix

10.1 General tightening torques

Tightening torques depend on bolt grade, thread friction and bolt head bearing area. The values given in the following tables are for guidance. These values should only be used if no other values are specified in the relevant chapters of the Operating Instructions or in spare parts sheets.

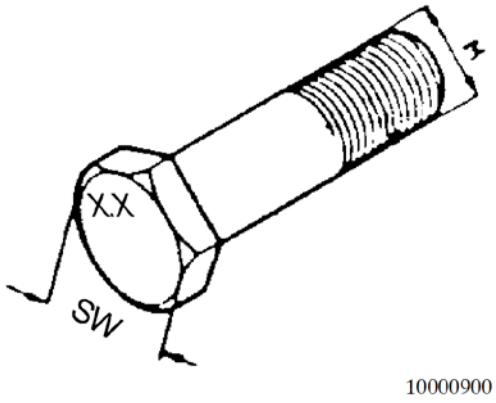
Caution

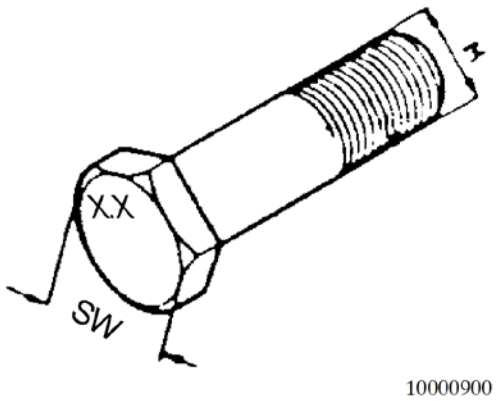
Bolts must always be replaced with bolts of the same size and grade.
Bolts with adhesive in the locking threads and self-locking nuts must always be replaced after removal.

The tables below give the maximum tightening torques (maximum torque) in Nm for a friction factor of mtotal = 0.14, with the thread lightly-oiled or lightly-greased.

Notes

All tightening torques X 1.1 apply for bolts with cement in the thread.

Set screws -- metric triangular thread, DIN 13, Part 13					
	Dimensions [mm]		**Tightening torque Md [Nm]**		
	M	**SW**	**8.8**	**10.9**	**12.9**
 SW = Width across flats (A/F) X.X = Grade 8.8, 10.9, 12.9	M 4	7	3,0	4,4	5,1
	M 5	8	5,9	8,7	10
	M 6	10	10	15	18
	M 8	13	25	36	43
	M 10	17	49	72	84
	M 12	19	85	125	145
	M 14	22	135	200	235
	M 16	24	210	310	365
	M 18	27	300	430	500
	M 20	30	425	610	710
	M 22	32	580	820	960
	M 24	36	730	1050	1220
	M 27	41	1100	1550	1800
	M 30	46	1450	2100	2450

Set screws -- metric precision thread, DIN 13, Part 13					
	Dimensions [mm]		Tightening torque Md [Nm]		
	M	SW	8.8	10.9	12.9
 SW = Width across flats (A/F) X.X = Grade 8.8, 10.9, 12.9	M 8 x 1	13	27	39	46
	M 10 x 1,25	17	52	76	90
	M 12 x 1,25	19	93	135	160
	M 12 x 1,5	19	89	130	155
	M 14 x 1,5	22	145	215	255
	M 16 x 1,5	24	225	330	390
	M 18 x 1,5	27	340	485	570
	M 20 x 1,5	30	475	680	790
	M 22 x 1,5	32	630	900	1050
	M 24 x 2	36	800	1150	1350
	M 27 x 2	41	1150	1650	1950
	M 30 x 2	46	1650	2350	2750