

Hot water unit MCB

Operator Manual

2018-08-30
Version V1.3
Original instructions



Thermal Weed Management

Preface

Copyright

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Disclaimer notice

This manual enables safe and efficient use of the machine. If the machine, or its individual modules or procedures, are used for purposes other than those specified herein, confirmation of their validity and suitability must be obtained.

In no event Empas BV. will be liable for any damages, direct, indirect, incidental, special, or consequential, resulting from any defect in the information, even if it has been recommended of the possibility of such damages. Empas provides the documentation 'as is' without warranty of any kind.

All mentioned values in this manual are indicative. It is the responsibility of the customer to optimise settings based on established deviations. The information contained in this manual is based on the latest information and is provided subject to alterations.

This manual does not consider local laws and regulations. When operating the machine, the operator always has the responsibility to make sure all applicable local laws and regulations are obeyed.

The English language manual is the original manual. Translations into other languages use the English language

manual as the source document. Empas BV. accepts no liability for discrepancies between the original English language manual and versions in other languages. If there is a conflict about the content and accuracy of any translated manual, the English manual is the authority document.

Trademarks

All trademarks stated in this manual are registered trademarks of their suppliers.

Warranty

WARRANTY PERIOD

Covering professional use by the buyer: twelve months from the delivery date.

CONDITIONS

If a fault with the product occurs under normal working conditions and within the applicable warranty period, the part will be replaced free of charge or repaired by an authorised Empas BV. dealer.

IMPORTANT

The following cases or items are not covered by the warranty:

- Any fault resulting from ignoring the instructions for proper operation and maintenance of the product, as described in this manual
- Damage caused by accident, abuse, neglect, modification of the machine, or use of other parts or accessories than those recommended by Empas BV.
- Any fault resulting from improper use
- Filter replacement
- Worn parts
- Normal maintenance tasks and adjustments, as described in this manual
- Incidental or consequential damage
- Transport costs for broken/repaired parts
- Frost damage.

The purchaser's legal rights shall not be influenced by this warranty.

Product liability

Empas BV. or subcontractor is not liable for any claims of third parties caused by inexpert use of the machine and/or for any claims arising from use other than as stated in this manual and in compliance with the terms of delivery.

For further details, see our terms of delivery (already in your possession).

Compliance

The machine has been tested, certified and found to comply with:

- the machinery directive 2006/42/EC,
- the EMC directive 2014/30/EU,
- the noise emission directive 2000/14/EC.



The product also complies with all applicable CE-directives and therefore bears a CE plate.

The following (components of) the harmonized and national standards have been applied:

- NEN-EN-ISO 12100,
- NEN-EN-IEC 60204-1,
- NEN-EN-ISO 3744.

The instructions in this document do not take into account different national regulations and laws. When operating the machine, it is the sole responsibility of the user to make sure that all applicable local laws and regulations are obeyed.

Recommissioning

In the event of a recommissioning (e.g. relocation of the machine or a transfer of ownership), Empas must be contacted to discuss the procedures, terms and conditions, service contract, etc., such that proper functioning and safety of the machine after recommissioning can be guaranteed.

If Empas is not involved in a recommissioning, then Empas is not liable for any claims of third parties arising from that recommissioning.

Contact data

If you have any questions or need further details on specific matters concerning the equipment, please do not hesitate to contact your dealer:

Dealer:	
Address:	
E-mail:	
Internet:	

Or see [dealerlocator online](http://www.empas.nl/en/service/dealers) (www.empas.nl/en/service/dealers)

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1

About this manual

1.1

Scope of this manual

This manual describes the safety issues, operating, cleaning and operator related maintenance of the machine. It contains essential information for proper operation of the machine. Following the instructions contained in this manual should assure trouble-free, safe operation of the machine.



Caution

Before using the machine, read this manual closely to get familiar with the functioning and strictly observe the given indications and instructions. Make sure that you (the operator of the machine) understand the correct operating procedures and all safety precautions. If you don't understand any part of the information in this manual, contact your local service department.

The information contained in this manual is based on the latest information. It is provided subject to alterations.

The purpose of this manual is to:

- describe the principles, working actions and layout of the machine,
- explain the safety features,
- highlight possible hazards,
- describe start-up and shutdown procedures of the machine,
- detail operating procedures for various circumstances,
- detail operator maintenance,
- solve elementary machine problems.

1.2

Audience of this manual

This manual describes how to use and maintain the machine. It is intended to be used by operators.

Normal routine operation of the machine, requires that these operators:

- have read and understand this manual,
- have been adequately trained,
- understand and are able to execute the procedures in this manual,
- have enough technical knowledge and experience to carry out the assigned tasks,
- can recognise and prevent possible hazards,
- ensure that the machine will not harm personnel and/or damage its environment.
- can operate the machine without causing needless damage or wear to the machine.

If the operator has permission to do maintenance actions or to change parameters, Empas expects that the operator is trained for these tasks.

1.3

Typographical conventions

Before you start using this guide, it is important to understand the terms and typographical conventions used in the documentation.

The following kinds of formatting in the text identify special information:

- **Bold text** indicates a menu name in the user interface, example:
Main Menu
- *Italic text* indicates a (sub)title and information that needs special attention, example:
Read these instructions carefully
- "Monospace text" indicates a message shown in the user interface, example:
`"Emergency stop active"`

- **[Text between brackets]** indicates a control element like a soft key, a keyboard button, a hardware button and a rotary knob, examples:
[Start]
[Enter]
[2]
[ON/OFF] switch
- 1. Numbered text indicates an action that you should do in a specific sequence, example:
1. Press the power button.
2. Close the valve.
- Bullets (•) are used for lists of items or actions, examples:
The control panel contains:
 - a screen,
 - an emergency stop button.
- [Blue text on page 21](#), or (see "....." on page ...) indicates a cross-reference to a section, table, figure etc.. The main purpose is easy recognition in all publication formats. In electronic documents a cross-reference acts as a hyperlink that you can click to navigate through the manual. Example:
See chapter [Safety on page 21](#).
- The safety symbols indicate situations or actions that may endanger the operators and service engineers; see section [Safety signs on the machine on page 27](#).

The following text styles and symbols are used to indicate situations that may endanger users, cause damage to equipment or need special attention:



Note

Provides additional information that is helpful to carry out a task or to avoid problems.



Caution

Warns for a situation that may cause material damage if one does not follow the (safety) instructions.



Warning

Warns for a situation that may cause physical injury and/or material damage if one does not obey the (safety) instructions.

1.4 Units of measurement

The units in this manual are according to the SI-standards.

1.5 Availability of this manual

Empas expects this manual to be available to all operators of the machine. The original hard copy (paper) version should always be available near the machine.

1.6 Related documents

The documentation package of this machine consists of:

- Operator Manual
This manual contains all relevant items required for the operation and operator related maintenance of the machine.
- Spare Parts Manual / Spare Parts Lists
This manual contains all the relevant system engineering drawings as well as the lists of spare parts of the machine.
- Additional documentation
The machine contains many items of equipment not manufactured by Empas but part of the installation. The documentation of this equipment is part of the delivered machine documentation. If not provided with this manual, you can request this additional documentation from Empas.



Note

For additional information of maintenance procedures always refer to the documentation of the equipment manufacturer.

1.7 Supplements to the manual

During the lifetime of the Hot water unit, advances in engineering may result in the need to revise this manual. Thus you may receive (hard copy) supplements or errata from Empas. These must be incorporated immediately. Make sure that electronic versions of the manual are also updated by Empas.

1.8 How to get help

If you need help to operate or maintain the machine, please contact our local vendor organization in your country; see section [Contact data on page 6](#).

1.9

Version history

The following table describes the main changes for each document version of this manual.

Version	Date	Changes
1.0	07-07-2017	Original edition
1.1	12-07-2017	Added declaration of conformity
1.2	25-09-2014	Minor text corrections
1.3	30-08-2018	Added option 80°C water intake

1.10

Corrections and additions

Every effort has been made to make this manual as accurate and complete as possible. It will be appreciated if you report any error or omission to Empas.

2

Introduction

2.1

Functional description

The Empas MCB is primarily intended for weed control on (semi) hard surfaces. The machine is also suitable for high-pressure cleaning.

In its basic form, the MCB is a stationary hot water production unit installed on a frame. The MCB can also be supplied in the following versions:

- electrical trolley,
- manually drivable trolley,
- electrical vehicle,
- mounted on a trailer.

MCB on a trailer



Weed control

The hot water production unit comprises a water tank with a capacity of 500 litres (basic model), a high-pressure pump that delivers water to the boiler, a return water circuit that recirculates the water when it is not used, and a spray lance with a pourhead, a high-pressure nozzle and a delivery hose. The maximum spray volume, with water at 102 °C, is 12 litres per minute.

The water tank can be filled with tap water, using a hose, or with surface water using a pump and a high-pressure hose (optional).

High-pressure cleaning

A second hose reel with a longer hose is one of the available options. This option is intended for (hot or warm water) surface cleaning, etc.

2.2

Specifications

MODEL: MCB	
Water temperature	Maximum 102 °C
Water flow rate	Maximum 12 liters per minute
Water supply tank capacity	500/800/1000 liters
Capacity tank depending on type	
Capacity of the boilers	≈ 78 kW
Diesel consumption	Maximum 8 liters per hour
Weight of the MCB without a vehicle, nominal, with an empty 500-liter tank	≈ 470 kg
Weight of the MCB with manually drivable trolley	≈ 550 kg

2.3

Options

The MCB is available in various versions and with several options to suit your wishes. For example:

- Mobile chassis
- High-pressure pump with petrol drive motor, electro drive motor or diesel drive motor.
- Water pressure 55 or 150 bar

- Water tank for 500, 800 or 1000 liter
- Water heater with diesel oil or propane gas
- Petrol engine drive pump for filling with surface water and applicable hose
- Additional hose reel with spray lance for cleaning
- Hot water intake (maximum water temperature 80 °C).

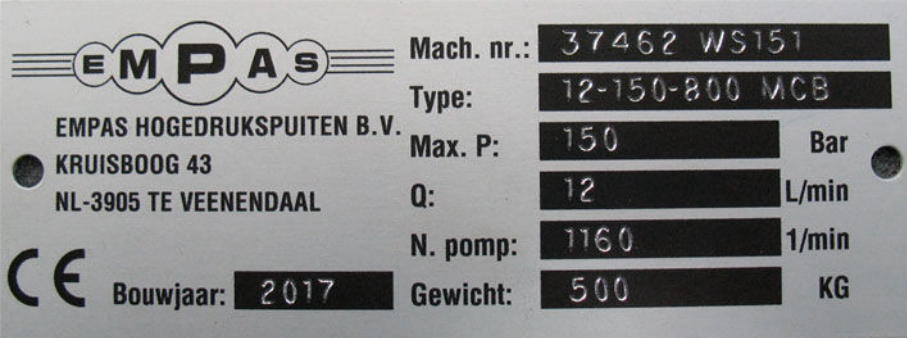
Refer to the [Empas website on page 6](#) for more information or ask your dealer.

2.4

Inscription plate data

The type plate is on the left side of the machine. The type plate shows the basic identification and specifications of the machine.

Type plate



Item	Meaning
Mach.no.: WS151	WS151: Pump type
Type: 12-150-800	12: l/min; 150: spray lance pressure 800: water tank capacity (liter) MCB: type of hot water machine



Note

The pump type of the MCB with the 80 °C option is WS 202.

3.1

General safety instructions

The machine is designed and manufactured with optimal attention to avoiding, as far as possible, security risks for users and other persons in the area during operation of the machine. But you should always respect any prevailing regulations on accident prevention at work.

- Operational and warning stickers covering the most important safety measures are applied to the equipment. Make sure they remain easily legible and are not removed.
- Only allow persons over 18 years to operate the appliance, and ensure that they have taken good note of this user guide and will adhere to all the given conditions and instructions closely and strictly (i.e. professionally competent people).
- Make sure that the appliance is never operated by persons who are tired or under the influence of alcohol or drugs.
- Please note that in some cases local regulations may require a license for operating a high-pressure sprayer with a temperature above 100 °C.
- If any part of these instructions is unclear, do not hesitate to contact your Empas dealer, preferably before using the MCB.
- The safety cover must be closed during operation.
- Do not operate the machine near other people and animals. If people or animals enter your working zone, close off the spray lance immediately.
- It is obligatory for the operator to have a mobile phone, for use in case of any accident.
- The user must be familiar with the use and control of the machine.
- Make sure that any surface water used is reasonably clean.
- Never carry out repairs on the machine while in operation.

3.2

Specific safety instructions

3.2.1 Mechanical

Precautions to be taken when working with mechanical equipment:

- Always use enough people to handle heavy parts (max. 23 kg per person).
- Always use spare parts of a type and part number recommended by Empas.



Caution

Running a machine with missing components can cause severe damage. Always make sure the machine is complete before you start to operate it.

3.2.2 Forklift hazards



Note

For a safe operation of a forklift truck always refer to the descriptions and procedures in the latest versions of this documentation:

- Directive 2006/42/EC Machinery (a forklift truck is a machine according to this directive),
 - Directive 2009/104/EC Minimum safety and health requirements for the use of work equipment by workers at work,
 - The forklift truck documentation.
-

These are *some* recommendations when you work with a forklift truck:

- Never lift persons with the forklift truck.
- Always wear appropriate protective clothing when driving a forklift truck.
- The forklift truck driver always has to keep a safe working distance from people working on or near the machine.
- Adapt the travelling speed of the forklift truck to the load and the layout of the workplace.
- Never exceed the maximum lifting capacity of the forklift truck.
- Secure each load correctly to prevent that the load falls from the fork.
- Forklift trucks must be adapted or equipped appropriately to limit the risk of overturning.

3.2.3 Electrical

Precautions to be taken when working with electrical equipment:

- Keep your clothing, hands and feet dry.
- Do not wear rings, watches, metal-rimmed glasses or jewelry when working around electrical circuits.
- Maintenance activities on the electrical system of the machine may only be done by special trained electricians who are familiar with the common and local electrical regulations in charge.

3.2.4 Chemical

- Used lubricants, batteries, etc. should be handled and disposed of in a proper manner, in compliance with local environmental regulations.

3.2.5 Pressure

Precautions to be taken when working with equipment which can generate a high pressure:

- Be aware that the high-pressure pump creates high pressures when in operation.

3.2.6 Noise

The machine is designed and constructed to reduce the emission of noise to the lowest level, and noise is particularly reduced at the source. This is laid down in the Machinery directive 2006/42/EC. During normal use of the machine, measurements are done to assess the sound levels around the machine, at places where operators, maintenance and service engineers will be or could be working. This mandatory assessment is laid down in 'Noise' directive 2003/10/EC.

The administrator of the machine thus knows the potential noise risks, and has the responsibility to put warning signs at locations where noise emissions might be around or above the limit. These signs are placed on the covers around the machine, so everyone is prepared to higher noise levels when approaching a machine.



Use hearing protection at places where you see this safety sign.

3.2.7 Heat

Precautions to be taken when working with equipment which can generate a high temperature:

- Be aware that parts of the machine, for example the spray lance, may be hot when in operation. Also during maintenance activities, be aware of these hot parts. The hot parts can cause (severe) skin burns.
- Always wear the proper clothing and protective equipment to protect against hot and splashing water, preferably safety glasses and gloves.
- Even after stopping the machine, parts may stay hot for a longer period.
- Be aware that the surface of the water tank may be hot when the water tank is filled with hot water. The intake of hot water (maximum 80 °C) is optional.



Hot parts are indicated with warning stickers.

3.3

Safety devices

Safety devices are installed to protect the user.



Warning

It is not allowed to bypass or switch off the safety systems.



Note

If the safety cover must be opened for maintenance, cleaning or repair, it must be closed immediately after the work has been completed.



Note

Test all safety devices once a year for proper functioning.

3.3.1 Safety cover

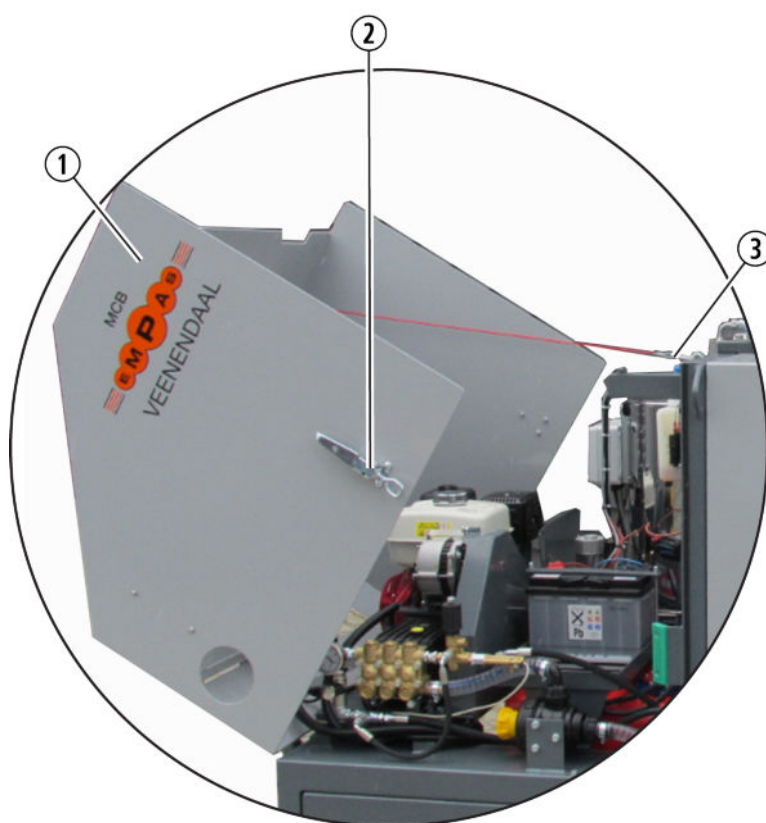
The safety cover can be opened for inspections and maintenance.



Warning

Always turn the [ignition key on page 37](#) to the OFF position before you open the safety cover.

Safety cover



1. Safety cover

3. Retaining cable

2. Locking

3.3.2 Temperature sensor

If the water or boiler temperature becomes too high, the heating unit switches off. The temperature increases until the boiler is cooled down.

3.3.3 Water flow safeguard

A flow sensor measures the flow rate to prevent the boiler from overheating when there is no water. If the flow fails, the boiler will be switched off and the green light in the Burner on/off switch [extinguishes on page 37](#).

3.3.4 Pressure sensor

The pressure switch switches off the burner when the working pressure falls below the minimum value and switches it on again when the pressure exceeds the minimum value.

3.3.5 Unloader (Pressure regulator)

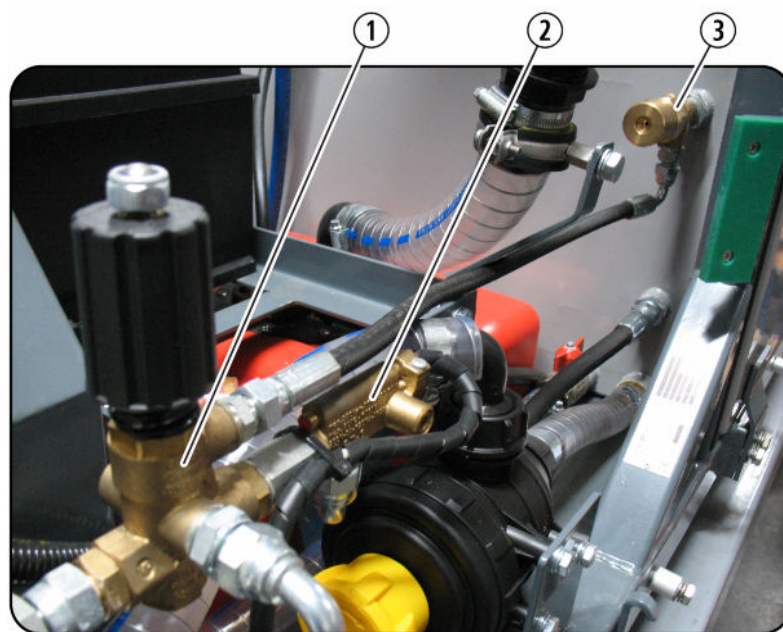
The unloader or pressure regulator has two functions.

If the hand spray gun is closed, the unloader switches to pressureless bypass operation. The unloader diverts the water back to the water supply tank. Thus, the permissible working pressure is not exceeded.

The pressure regulator is used to set the working pressure. By default the pressure is 120 bar or 150 bar, depending on the machine type. The pressure can be lowered by the dealer if needed. When the high-pressure pump is running and the spray lance is not operated, the water is recirculated into the tank.

In this manual the unloader or pressure regulator is called the unloader.

The unloader, the flow switch and the safety valve



1. Unloader

2. Flow switch

3. Safety valve



Note

Test all safety devices on a regular basis. Refer to the company procedure for the test frequency.

3.4

Safety signs on the machine

The machine is provided with safety signs.



Note

Regularly check if all the safety signs are still on the machine where they should be. If signs are lost or are damaged (unreadable), apply new ones at the correct places. Refer to the [safety drawing on page 14](#) for the exact locations.

Safety sticker



- | | |
|---|--------------------------|
| 1. Caution: high-pressure cleaning with hot water | 4. Wear protective shoes |
| 2. Caution: hot surfaces due to cleaning or weed control with hot water | 5. Read the manual |
| 3. Caution: dangerous hot damp | |

3.5

Personal protective equipment

When working with this device, you must wear:

- Protective clothing
- Protective, insulated gloves for working with water above 105 °C
- Protective and insulated shoes or boots

When working with this device, it is advised to wear:

- Facial and/or eye protection.

3.6

Environmental aspects

3.6.1 Packaging material



The packaging material can be recycled. Please do not throw the packaging material into household waste; please send it for recycling.

3.6.2 Batteries



Please dispose off the batteries in an environment-friendly manner. Batteries and accumulators contain substances that must not enter the environment. Please dispose them off using appropriate collection systems.

3.6.3 Oil and similar substances



Oil and similar substances must not enter the environment. Please dispose of your waste materials using appropriate collection systems.

3.6.4 Emissions

Diesel exhaust has been found to contain many toxic air contaminants. It is a carcinogen which causes lung cancer and is associated with bladder cancer. Fine particle pollution causes deleterious health effects.

It is very important that the exhaust of the running diesel engine cannot reach closed areas with the possibility that people are exposed to (parts of) the exhaust.

3.6.5 End of life disposal

Old appliances contain valuable materials that can be recycled; these should be sent for recycling.

Once the machine has reached the end of the useful life, the owner and/or user is responsible for the safe disassembly of the machine and for the disposal of the components, in accordance with the local laws or regulations in force.

3.6.6 REACH declaration

The REACH regulation came into effect on 1st June 2007. Regarding human health and environment, the target is to manufacture and to use only safe chemical substances inside the EU.

Considering the terms of the regulation, Empas manufactures articles and is downstream-user of chemical substances.

Empas has the intention to fully comply to REACH regulation and checked his suppliers to make sure they comply to REACH requirements for all materials and substances used in our products.

Empas will provide relevant information e.g. Safety Data Sheet (SDS) on request.

4

Description

4.1

Main components

The machine has the following main components:

- Water supply tank with filters and a water softener unit
- High-pressure pump with a drive engine
- Water heating unit with boiler, heated with diesel or gas
- Return water circuit
- Spray lance (optional two) with a delivery hose on a reel
- Control system.

4.1.1 Water supply tank

The water supply tank can be filled with clean water through the water supply opening, see the following figure (4), using an external pump or pressure system. The water supply opening (4) can also be used to inspect the inside of the tank and to bleed the water tank.

The water supply tank has also a connection point for a tap water supply hose (1). A separate coupling (GeKa®) is available for this purpose. This inlet has a float valve (optional) that stops the water supply when the tank is full. The intake of hot water (maximum 80 °C) is optional.

The tank can also be filled with surface water, using an external pump and a supply hose connected to connection point (3). Connection point (3) can also be used for tap water. This supply point has a coarse filter (2).

A water level dipstick is installed on the rear side to indicate the water level in the tank.

The water supply tank has a drain valve to drain the supply tank.

4.1.1.1 Water filters

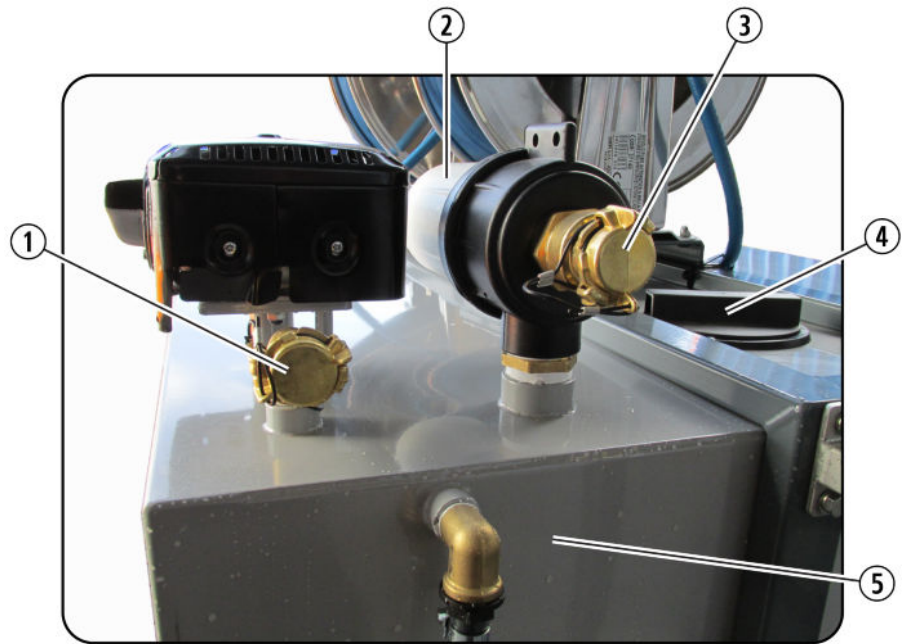
There are three water filters:

- a normal filter filters the water before it enters the tank

- a fine filter protects the high-pressure pump and the water heating unit
- a coarse filter is installed on the foot valve of the surface water suction hose (option).

When refilling, the water passes through the normal and the fine filter. When filling with surface water the water also passes the coarse filter.

Water supply tank



- | | |
|--|----------------------|
| 1. Water supply coupling (only tap water) | 4. Water supply cap |
| 2. Coarse filter | 5. Water supply tank |
| 3. Water supply coupling for surface (and tap) water | |

4.1.1.2 Water softener system

Maintaining the supply of water softener is necessary for preventing limescale in the water heating and hot water circulation circuits. Limescale can be detrimental to the systems function, and will lead to a need for maintenance much earlier than normal.

Limescale can be avoided by adding softener to the water supply tank or by an ultrasonic decalcifier.

The MCB available with:

- Water softener tank with manual dosing

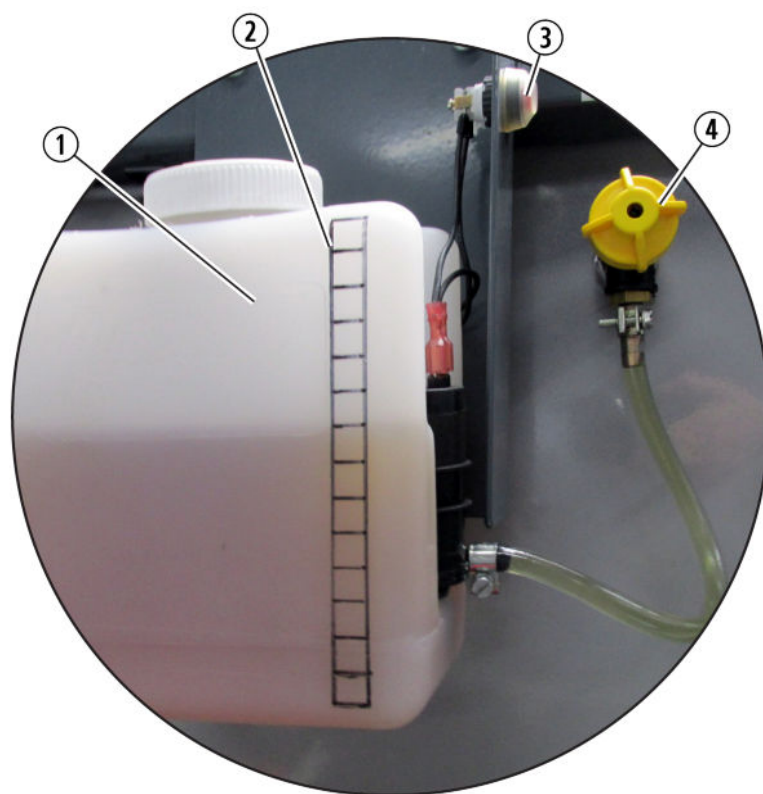
- Water softener tank with automatic dosing
- Ultrasonic decalcifier.

You add water softener (see [Table water softener new on page 75](#)) to the tank whenever you refill the water. You do that by pressing the button (3), which pumps water softener into the water tank.

The amount is dependent on the hardness of the incoming water (mains water, surface water, ground water). You can test the hardness of any type of water with a test strip. You can order test strips and water softener directly from your machine supplier (the manufacturer or importer).

You should always be aware that water hardness could vary between water supply locations. And water hardness can even vary at the same location, e.g. through rain or a thunderstorm.

Water softener tank



1. Water softener tank (MC210)

2. Scale / (100 ml)

3. Water softener addition button

4. Valve

4.1.2 High-pressure pump with drive engine

The high-pressure pump delivers the water through the water heating unit to the spray unit. The pump's operating pressure is 55 bar. There is an optional version with 150 bar pump pressure.

The debit, in liters, is in linear proportion to the engine's running speed. However, the engine has a set maximum RPM.

4.1.2.1 Drive engine

A petrol drive engine drives the high-pressure pump and the dynamo that charges the battery.

4.1.2.2 Dynamo and battery

The battery that is required for constant electrical power to the control unit and the water heating unit.

4.1.3 Water heating unit

The water heating unit has a spiral heating unit with a maximum rating of 78 kW.

4.1.3.1 Diesel tank

The water heating unit runs on diesel fuel. There is a separate supply tank. The filler cap is on the left side.

4.1.4 Return water circuit

During operation the high-pressure pump pumps the water through the water heating unit to the spray lances. Otherwise the water is directed to the tank, refer to the [schematic overview on page 76](#).

4.1.5 Spray lance and high pressure hose

The Hot water unit has:

- A spray lance with a hose reel for weed control with boiling water.
- A spray lance with a hose reel for pressure cleaning with cold water (option).

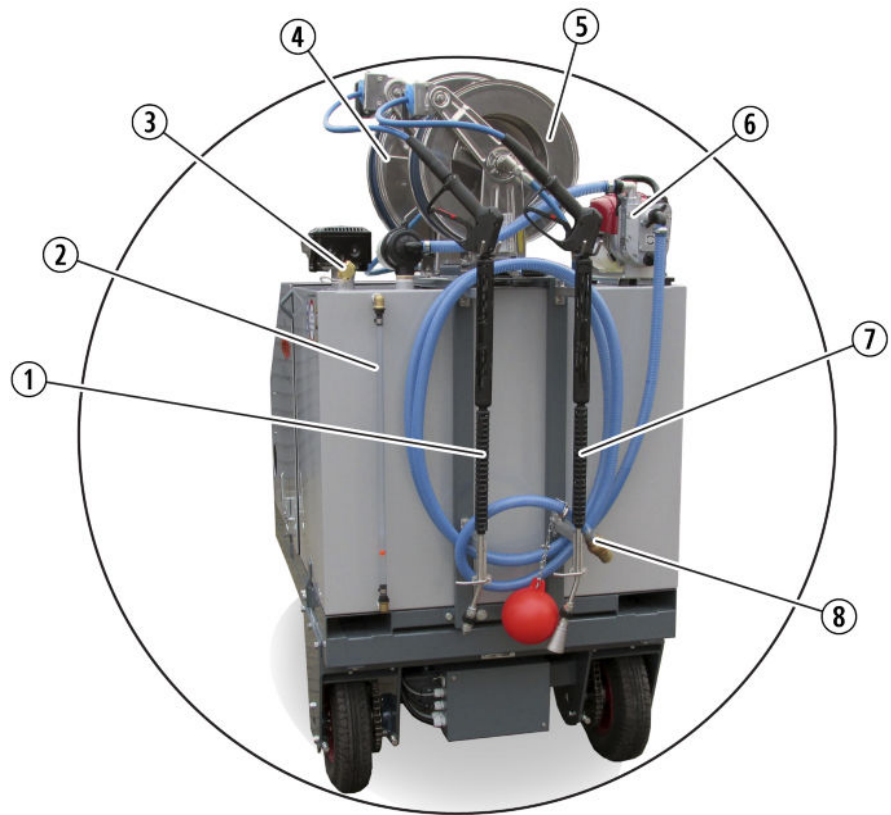


Note

Both spray lances can be used for weed control and high-pressure cleaning.

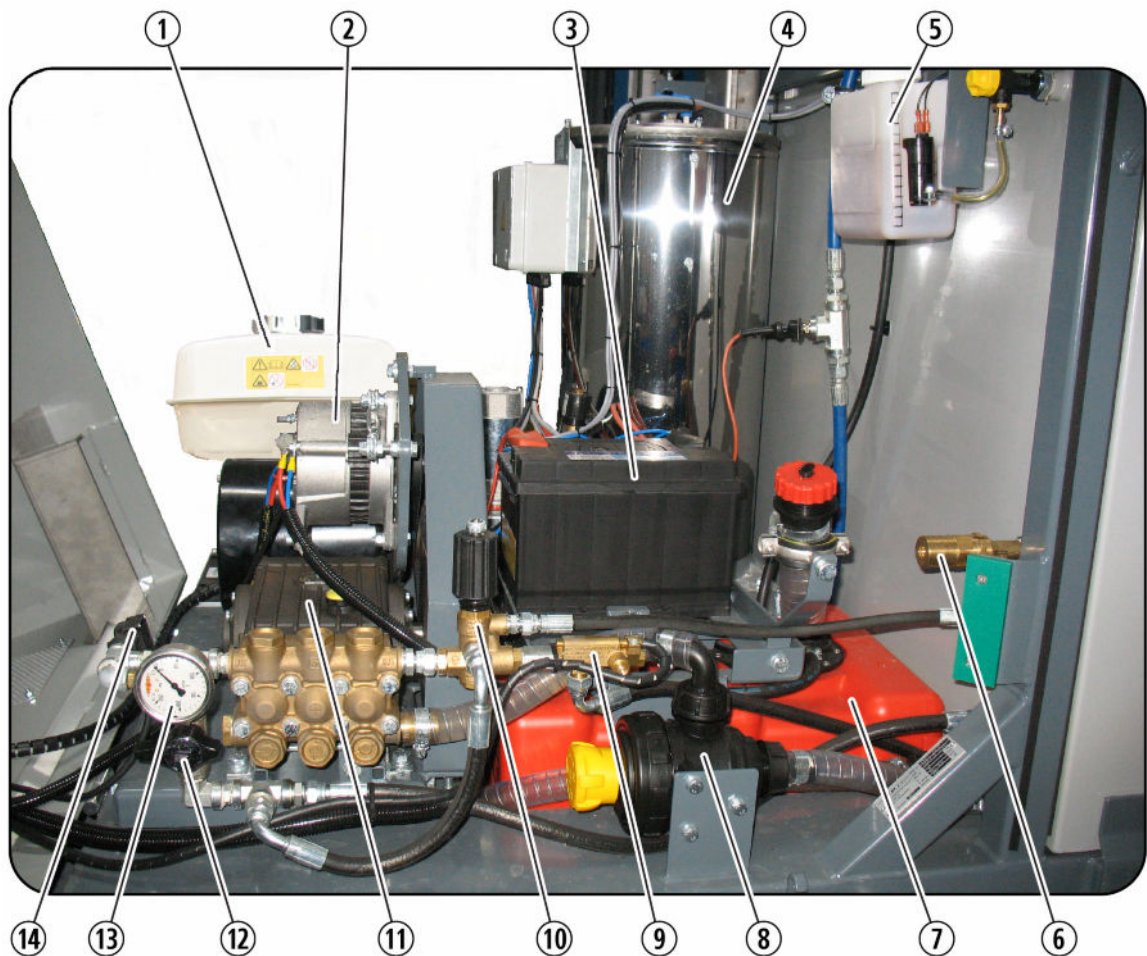
4.1.6 Overview

Top and rear side



- | | |
|--|-----------------------------------|
| 1. Spray lance | 5. Hose reel hot water, 20 meters |
| 2. Water level dipstick | 6. Water filling pump (option) |
| 3. Water filling point with normal filter (only tap water) | 7. Spray lance |
| 4. Hose reel cold water, 35 meters (option) | 8. Surface water hose (option) |

Interior



- | | |
|-------------------------------------|-----------------------------------|
| 1. Petrol engine | 8. Fine filter |
| 2. Dynamo | 9. Flow switch |
| 3. Battery | 10. Unloader (Pressure regulator) |
| 4. Boiler | 11. High-pressure pump |
| 5. Water softener reservoir (MC210) | 12. Freewheel return valve |
| 6. Safety valve | 13. Manometer |
| 7. Fuel tank | 14. Pressure sensor |



Note

For German market only; Heating oil can also be used for the burner kettle.

4.2

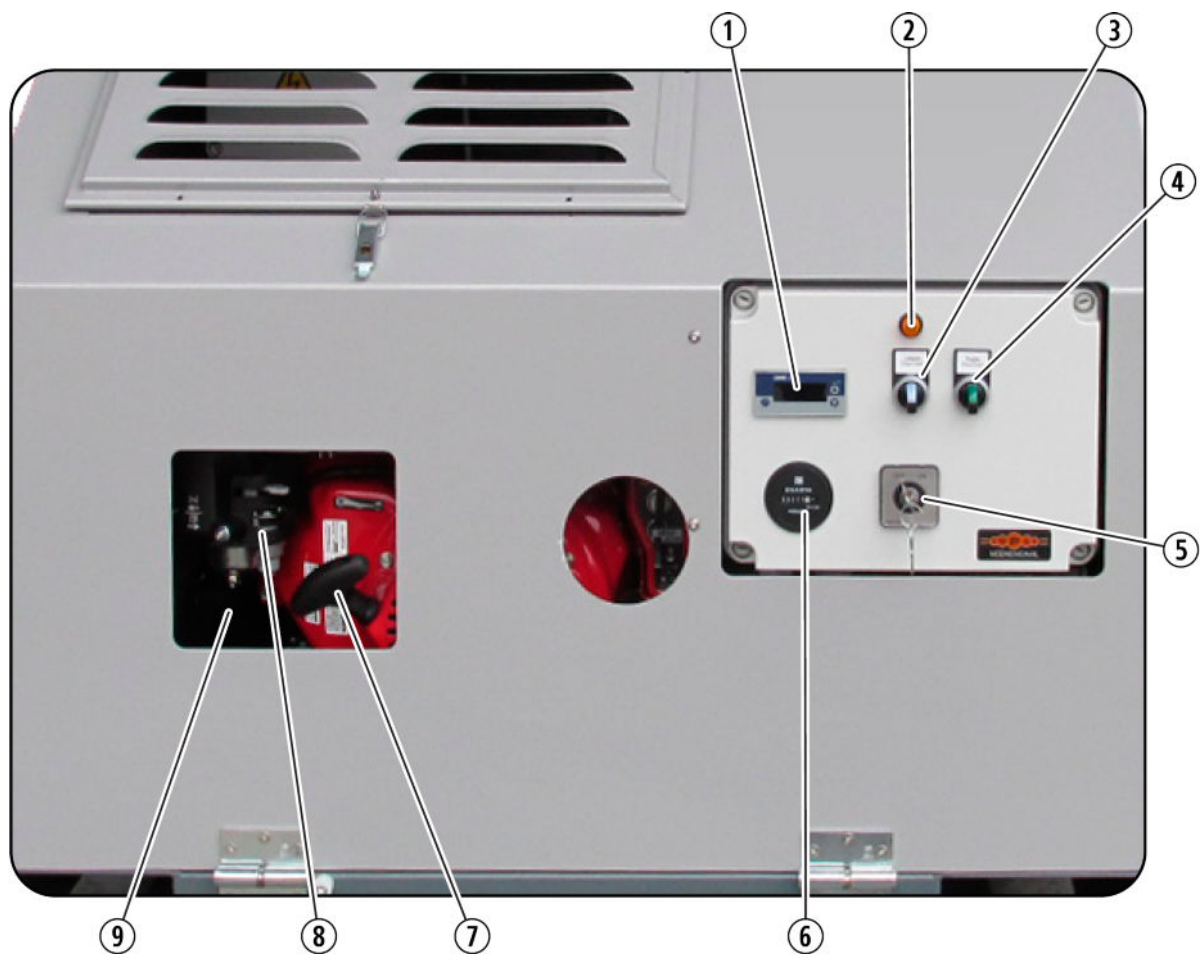
Control components

4.2.1 Control panel and engine controls

- The control panel for the switch box with a control unit and control buttons mounted on it
- Recoil starter, engine speed handle and choke

Operating components: three switches on the switch box, the engine recoil starter, petrol tap, choke, and the freewheel return valve.

Control panel and engine controls



- 1 Temperature indicator
- 2 Charging power indicator
- 3 Dynamo on/off
- 4 Burner on/off
- 5 Ignition key (engine/power circuits)

- 6 Hour meter
- 7 Recoil starter cord
- 8 Choke
- 9 Engine speed handle

There is only power supply to the heating unit (burner and fan) when the dynamo switch is in the on position.

Turning on the switches on the switch box panel also activates the power to the pump and boiler safety circuits.

The charging indicator illuminates when the machine is switched on. When the dynamo is running, the lamp should go out. If the charging indicator is lit while the machine is in operation, there is a problem with the charging power.

4.2.2 Manometer

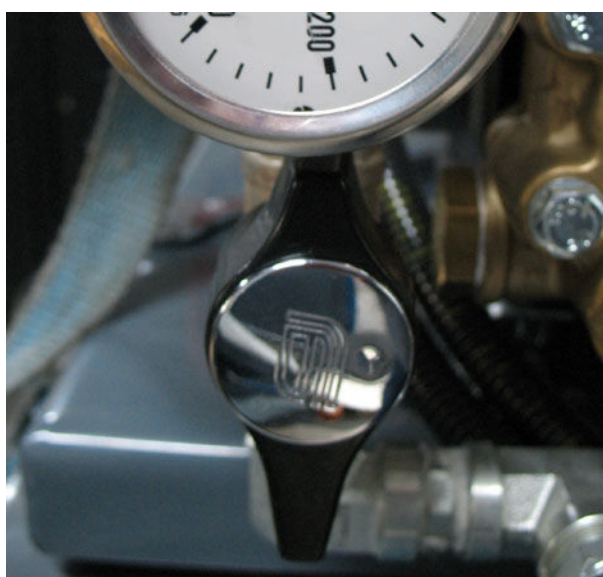
The manometer measures the water pressure on the supply side of the high-pressure pump. It is also used for service to detect if the resistance due to calcification is too high.

4.2.3 Freewheel return valve

The freewheel return valve is used to de-pressurize the circuit in case the motor does not start immediately. It has two positions:

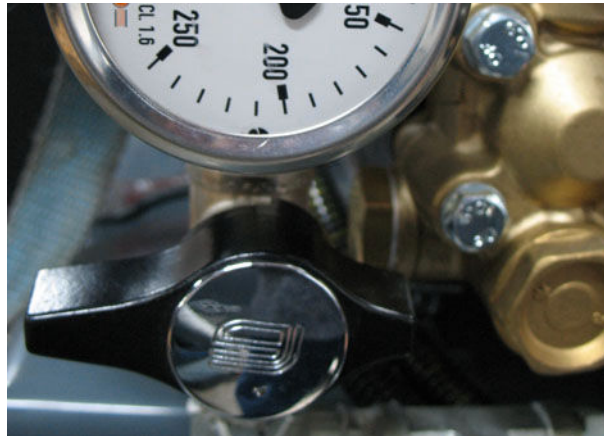
- The through-flow position, which allows the water to recirculate into the tank

The freewheel return valve in open through-flow position



- The operating position to direct the water to the water heating unit.

The freewheel return valve in closed operating position



4.2.4 Unloader

The unloader is used to set the water pressure. By default the pressure is 55 or 150 bar, depending on the machine type. The pressure can be lowered if needed. When the high-pressure pump is running and the spray lance is not operated, the water is recirculated into the tank.

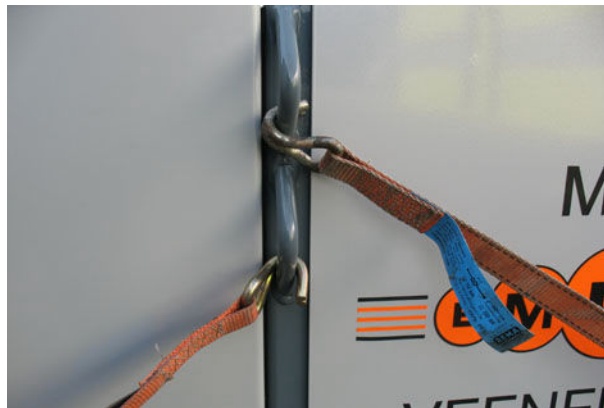
5

Transport

The machine should be transported by suitable means of transport. First and foremost consider the permitted load capacity.

Always secure the load tightly with specially designated securing straps.

The securing straps



Always place the machine on a stable loading floor with sufficient load-bearing capacity.



Note

Empas is not responsible for damage resulting from incorrect transport and storage. Guarantee rights will not be accepted in the event of incorrect transport and storage.

5.1

Move the machine with a fork lift

Never lift the Hot water unit from the side.

1. Slide forks from the front or rear side into the pockets under the Hot water unit.

Forklift pockets



1. Forklift pockets

6

Operating procedures

Operators and technical service should be familiar with all safety aspects. To ensure the safety of the personnel, you must read and understand the chapter [Safety on page 21](#) before carrying out any tasks on the machine.

6.1

Plan your tasks

The water supply in the standard 500-litre tank is good for forty minutes continuous surface treatment at the maximum level. In actual use, the machine is not usually operating continuously. Thus you need to estimate how frequently you will actually operate the sprayer and for how long. In that way, you can work out how often you need to refill the water tank. In practise, you will need to refill the tank with water several times a day.

And – when aiming for efficient use – it is obviously advisable to plan well, taking account of the driving time from the refilling point to the working location.

It is therefore important that there is a sufficient supply of water available for any proposed task, so that it does not run out half way through the job.

And you should not forget to make sure that you have enough fuel available on the job.

6.2

Prepare for operation



Caution

Make sure the slope of the underground is below 14 degrees.



Caution

Insufficient water in the water supply tank damages the high-pressure pump.

1. Make sure:

- There is sufficient fuel in the high-pressure [pump drive tank on page 44](#)

- There is sufficient fuel in the tank for the water heating unit for the [planned task on page 45](#)
 - There is sufficient water in the tank for the [planned task on page 47](#)
 - There is sufficient MC210 in the water [softener tank on page 32](#).
2. Test the water hardness with a test strip and add [water softener to the tank on page 49](#).

6.2.1 Fill-up the petrol tank of the high-pressure pump drive



Caution

Only use unleaded petrol with a pump octane rating of 86 or higher, preferably Euro 95.



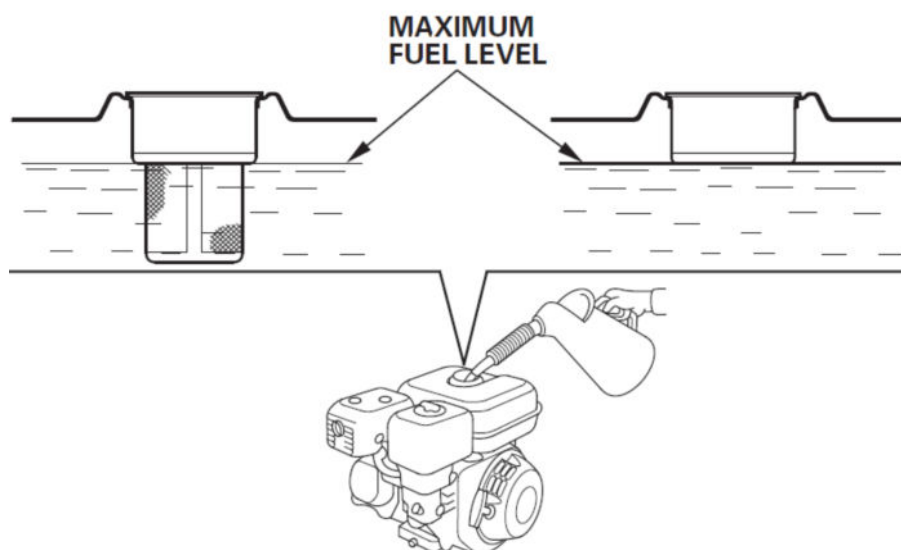
Warning

Petrol is highly flammable and explosive. You can be burned or seriously injured when refuelling.

- Stop the engine and keep heat, sparks and flame away
- Refuel only outdoors
- Wipe up spills immediately.

1. Move the machine to a level surface.
2. Make sure the Hot water unit is [switched off on page 37](#).
3. Open the safety cover.
4. Remove the fuel filler cap.
5. Check the fuel level.
6. Add fuel to the fuel tank until the fuel tank is full.
7. Tighten the fuel filler cap securely.
8. Wipe up spilled fuel before starting the engine.

Fuel tank



6.2.2 Fill-up the diesel tank of the heater unit



Caution

Only use diesel or GTL.

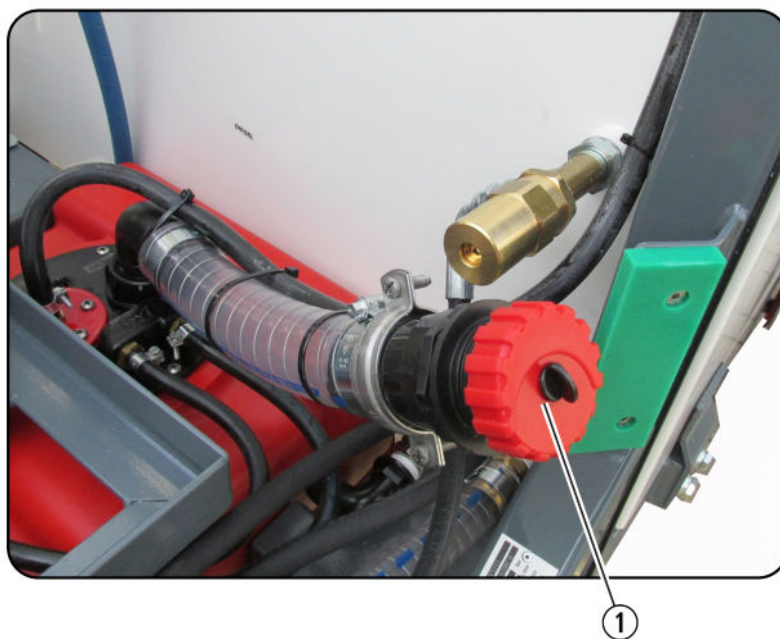


Warning

- Never use bio diesel
- Stop the engine and keep heat, sparks and flame away
- Refuel only outdoors
- Wipe up spills immediately.

1. Make sure the Hot water unit is [switched off on page 53](#).
2. Remove the fuel filler cap.
3. Check the fuel level.
4. Add fuel to the fuel tank until the fuel tank is full.
5. Tighten the fuel filler cap securely.
6. Wipe up spilled fuel before starting the engine.

Fill up the diesel tank



1. Fuel filler cap

6.2.3 Fill the water supply tank

1. Make sure that all the filters are still mounted properly.

6.2.3.1 Fill the water supply tank with surface water



Note

An external pump and a hose setup must be installed.



Caution

The hot water system may not be operated while filling with surface water.



Caution

Never let the high-pressure pump run dry (except in circumstances as described in [Take the machine out of service on page 55](#)).



Caution

Do not suck sand from the bottom!

1. Make sure the suction hose is submerged in the surface water or connected to a water supply.
2. Switch on the pump.
3. [Determine the water softener dosage on page 49.](#)
4. [Add water softener to the water supply tank on page 50.](#)



Note

The float valve stops the water supply when the maximum level is reached.

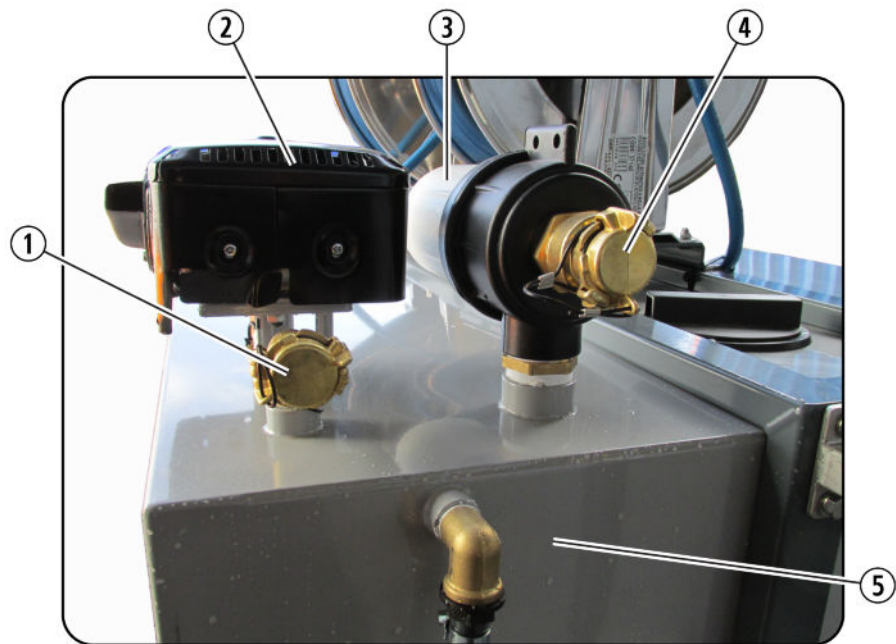
5. Fill the water supply tank until the water level dipstick indicates that the supply of water is enough for the [planned task on page 43](#).
6. Remove all filters (coarse, normal and fine filter).
7. Rinse the filters clean.
8. Install the filters.

6.2.3.2 Fill the water supply tank with tap water

1. Connect the supply hose with the bayonet coupling to the water filling point on the water tank.
2. [Determine the water softener dosage on page 49.](#)
3. [Add water softener to the water supply tank on page 50.](#)
4. Open the water valve until the water level dipstick indicates that the supply of water is enough for the [planned task on page 43](#).
5. Remove all filters (coarse, normal and fine filter).

6. Rinse the filters clean.
7. Install the filters.

Fill the water supply tank



- | | |
|--|----------------------|
| 1. Water supply coupling | 4. Water supply cap |
| 2. Coarse filter | 5. Water supply tank |
| 3. Water supply coupling for surface water | |

6.2.3.3 Fill the water supply tank with hot water (optional)



Warning

The surface of the water tank and other parts may be hot when the water tank is filled with hot water.



Warning

The maximum temperature of the water is 80 °C.

1. Connect the supply hose with the bayonet coupling to the water filling point (1) on the water tank.
2. [Determine the water softener dosage on page 49.](#)
3. [Add water softener to the water supply tank on page 50.](#)
4. Open the water valve until the water level dipstick indicates that the supply of water is enough for the [planned task on page 43.](#)



Note

The float valve stops the water supply when the maximum level is reached.

5. Remove all filters (coarse, normal and fine filter).
6. Rinse the filters clean.
7. Install the filters.

6.2.4 Determine the water softener dosage



Note

Determine the water softener dosage each time you fill the water tank.

1. Use a hardness tester to determine the water hardness (DH) of the tap or surface water used to fill up the water supply tank.
2. Find the appropriate [water softener \(MC210\) dosage on page 75](#) for the amount of added water.



Note

The indicated values are for a 1000 liter tank filled with fresh tap or surface water.

Water hardness (°dH)	Tick marks	ml
5	1	100
10	2	200
15	3	300
20	4	400
25	5	500
30	6	600



Note

In most cases 3 tick marks on the water softener scale (300 ml) is enough for a full tank

Test strips water hardness



6.2.5 Add water softener to the water supply tank

1. Make sure the Hot water unit is [switched off on page 53](#).
2. Open the safety cover.
3. Find the appropriate [water softener dosage on page 49](#).
4. Keep the button [**Water softener addition**] pressed until the appropriate dosage is pumped into the water supply tank.

Start operation

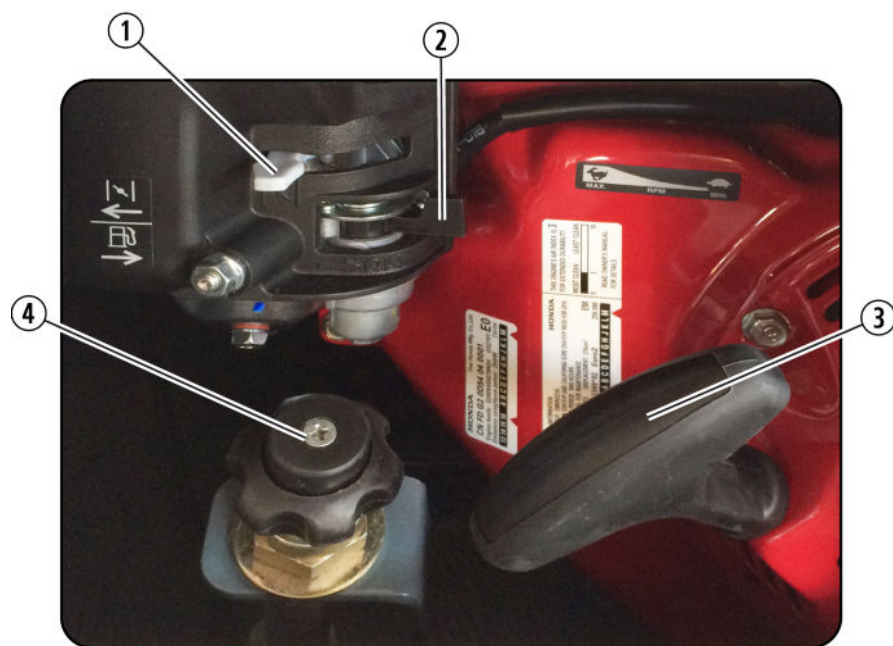


Warning

Devices, tubes, high pressure hose and connections must be in faultless condition. Otherwise, the machine must not be used.

1. Set the freewheel return valve to its through-flow position.
2. Turn on the [engine ignition on page 37](#).
3. Make sure the fuel valve lever (2) is in the ON position.
4. If the engine is cold, move the choke lever (1) to the CLOSED position.
5. If an electrical starter is installed, push the start button.
6. If no electrical starter is installed, pull the recoil starter cord (3).
7. If the choke lever (1) was moved to the CLOSED position, gradually move it to the OPEN position as the engine warms up.
8. Engage the dynamo and burner switches.
9. Make sure the charging indicator is off.
10. Set the freewheel return valve back to the operating position.
11. When necessary adjust the rotation speed;
 - If the water is very cold, lower the rotation speed with the rotation speed handle(4) to give the heating unit more time to heat up the water.
 - If the water is hot (hot water intake is optional) set the rotation speed to the maximum with the rotations speed handle(4). The heating unit needs less time to heat up the water.

Start engine



- 1. Choke lever
- 2. Fuel valve lever

- 3. Recoil starter cord
- 4. Rotation speed handle

6.4

Stop operation

1. Turn the freewheel return valve to the through-flow position.
2. Turn the [burner switch to the off position. on page 37](#)
3. Turn the [dynamo switch to the off position. on page 37](#)
4. Turn the engine ignition switch to the OFF position.

6.5

Operate with hot water



Warning

If for whatever reason people suffer injury from contact with the boiling water, immediately contact a doctor and/or call an ambulance.



Warning

Make sure that the pump never runs without water, because that will cause major damage to it.



Warning

Do not touch the metal parts of the spray lance, the water tank or the exhaust. These parts may be hot.



Note

The hot water unit can also be used for cleaning.

1. Turn the valve for the hose reel in the appropriate position (only applies to machines with two reels).
 2. Unroll the hose.
-



Note

The high pressure nozzle must be tightened less than hand-tight.

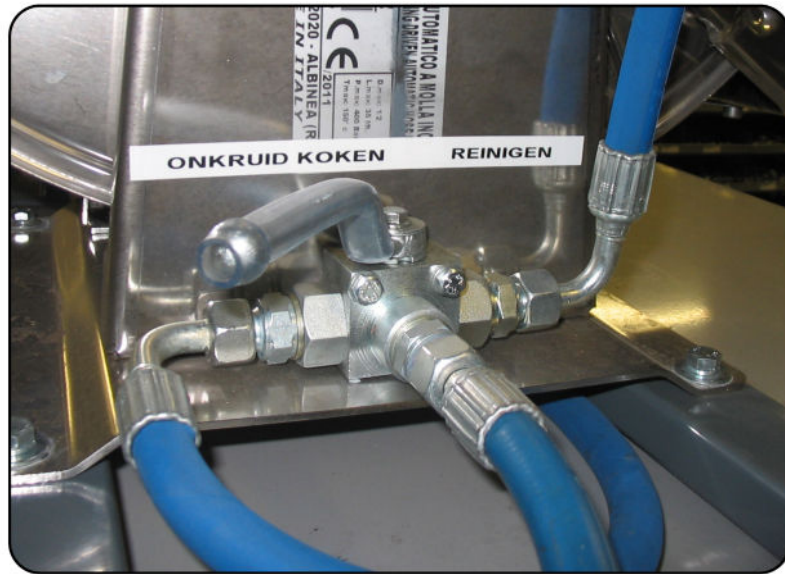
3. Tighten the high-pressure nozzle hand-tight and loosen it a quarter turn.
 4. Point the spray lance at the roots or the underside of the weeds.
 5. Press the lever on the hand spray unit.
 6. Move the spray lance up.
-



Note

The best way to destroy weeds is to start from the bottom.

Valve



Spray lance



6.6

Operate with cold water

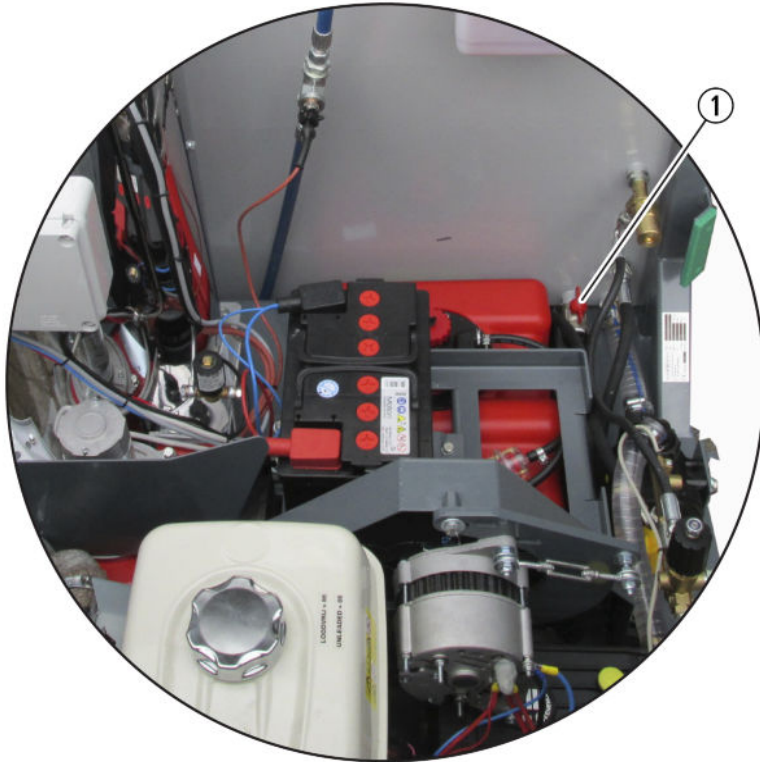
1. Turn the valve for the hose reel in the appropriate position (only applies to machines with two reels).
2. Unroll the hose.
3. Set the temperature:
 - a) Turn off the **[Burner on/off]** switch for cleaning with **cold water on page 37**.
4. Or: set the temperature with **[up/down]** buttons on the **thermostat on page 37**.
5. Direct the spray lance at the object to be cleaned.
6. Press the lever on the hand spray unit.

6.7

Take the machine out of service

6.7.1 Drain the water supply tank

1. Open the water drain valve (1).



6.7.2 Preserve the machine

Before storing the machine for longer periods, you should drain out the water circuit to avoid any risk from frost.

The method is as follows:

1. Take off the filter housings (normal and fine filter).
2. Release all couplings, to release all the water (i.e. draining).
3. Remove the supply hose.
4. Remove the coarse filter.
5. Remove the high-pressure sprayer.
6. Let the high-pressure pump run for thirty seconds (without water).
7. Let the water-filling pump (if fitted) run for thirty seconds without water or with coolant, refer to [Winter storage on page 56](#).
8. Protect the machine from rain.

6.7.3 Winter storage

1. Deflate the water supply tank completely.
2. Disconnect the supply hose from the water supply tank.
3. Connect the anti freeze supply hose to the water supply tank.
4. Make sure the anti freeze runs through the whole system.
5. Disengage the hose(s) with the spray lance(s) from the Hot water unit.
6. Make sure the hoses are empty (spray with air).
7. Fill up the fuel tank.
8. Optionally, add gasoline stabilizer to extend the life of the fuel. Refer to the manufacturer's instructions.
9. If applicable, fill the fuel tank with winter diesel.

6.7.4 Bring the machine back into service

1. Install the filter housings (normal and fine filter).
2. Tighten all couplings.
3. Install the coarse filter on the water supply hose (option).
4. Install the high-pressure sprayer.
5. Install the supply hose.

7

Packing and unpacking the machine

The machine is mounted on a skid and carefully packed for shipment. Do not remove it from the skid until it has been carefully checked for damage that may have occurred in transit.

All open ports on the machine were plugged at the factory to prevent the entry of contamination. These plugs must not be removed until just before piping connections are made to the machine.

8

Checks after receiving the machine

When you receive the machine, make sure all the components are present.

Claims for defects, flaws or incompleteness should be made immediately on receipt of (machine) parts. No responsibility will be assumed for delay, damage or loss of material while in transit or as a result of transit. Broken, damaged or incomplete part(s) should be refused, or a full description of the damage or loss should be directed to the haulier on the bill of carriage. In that case also inform the producer of the machine (parts).

9

Preventive maintenance

9.1

Operator maintenance



Danger

Do not carry out any actions other than those described.

Be aware of the following:

- If you are in any doubt about whether you should carry out an action or not, please contact your local dealer.
- If you are allowed to carry out an action but are unsure if you are able to do so, please contact your supervisor.
- Always observe the safety procedures when carrying out maintenance; see chapter [Safety on page 21](#).
- After carrying out the maintenance, always complete the final checks and actions listed in section [Preparations after maintenance on page 62](#).

9.1.1 Recommendations for maintenance

When doing maintenance on your machine (and also during normal operation) keep in mind the following recommendations:

- Keep the machine clean at all times.
- Repair damaged or worn parts instantly.
- Ensure that all fasteners are secured after maintenance.
- Do not attempt to operate defective equipment.
- Follow the safety instructions in this manual.
- Follow the safety regulations that apply to your site.
- For repairs and maintenance, always use original Empas parts or parts recommended by the Third Party Equipment suppliers.

9.1.2 Forms and administration

It is recommended to keep a record for each periodic maintenance procedure carried out on your machine. The

operator/engineer responsible for the maintenance should enter:

- The machine number.
- His or her name.
- The date and time.
- The work carried out.
- The working hours of the machine.

Daily periodic maintenance procedures do not require a signature or date - these procedures must be completed at the start of each work day.

9.1.3 Checks after maintenance

Always follow the next instructions and checks after doing maintenance:

1. Reinstall the removed protective devices.
2. Remove the special devices for doing maintenance.
3. Remove all tools, materials and equipment from the work area. Make sure that the work area is clean.
4. Verify that the machine has been assembled completely and correctly.
5. Test the operation at the regular settings.
6. Turn off the machine.

10

Preventive maintenance procedures

10.1

Safety during maintenance

Before doing any maintenance, you must be familiar with all the safety recommendations, devices and procedures as described in chapter [Safety on page 21](#).

At all times during any maintenance or repair tasks, turn off all working parts (engine, dynamo and burner).

10.2

Global visual inspection of the machine

- For trouble free operation and long machine life, the user should inspect the condition of components regularly.
- Maintenance should be implemented when necessary, i.e. parts re-tightened, repaired or replaced.
- Check the condition of the hot water hoses and the spray lances.
- Make sure the filters, i.e. the filling filter and boiler inlet filter, are regularly cleaned (see the instructions on maintenance, use, and operation).

10.3

Rinse, clean and replace the fine and normal filter

1. Take out the yellow stopper from the filter (bayonet coupling).
2. Unscrew the filter.
3. Remove the filter.
4. Rinse the filter.
5. Make sure the valve inside the filter is clean.
6. Install the filter.
7. Install the filter housing and screw it tight.
8. Insert the yellow stopper in the filter again and turn it firmly.

The fine filter



10.4

Check the pictograms

1. Make sure all [safety signs on page 27](#) are firmly attached.

10.5

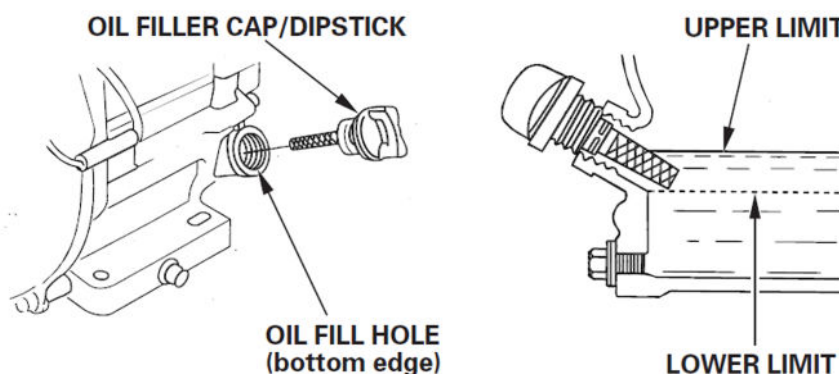
Check the oil level of the high-pressure pump



Note

This procedure is applicable for the Honda engine.

1. Stop the engine.
2. Make sure the engine is in a level position.
3. Remove the oil filler cap/dipstick and wipe it clean.
4. Insert the oil filler cap/dipstick into the oil filter neck as shown, but do not screw it in.
5. Pull it out to check the oil level.
6. If the oil level is near or below the lower limit mark on the dipstick, fill the tank with the recommended oil to the upper limit mark (bottom edge of the oil fill hole). Do not overfill.
7. Reinstall the oil filler cap/dipstick.



11.1

Problems and solutions

The following tables give an overview of the most common problems and their solutions or actions to solve the problem.



Note

In the event of malfunctions other than those described here, always consult the Service Manual or your technical services.

No water

Cause	Solution
Water tank empty.	Refill the tank.
Possibly a high-pressure pump fault.	1. Check the functioning 2. Do maintenance 3. Contact your local dealer on page 6
Blocked filters.	Clean the filters.
Freewheel return valve open.	Close the freewheel return valve.

Supply pump is not operating correctly

Cause	Solution
The suction hose not submerged properly in the surface water supply.	Ensure that it is submerged properly.
The coarse filter is blocked.	Clean the filter.

Insufficient pressure

Cause	Solution
The pump is not bled properly.	Bleeding (removing any air). Check the liquid in the tank.
The pump is sucking air.	Inspect the supply pipe and couplings.
Supply is blocked.	Inspect the water filters.

Cause	Solution
The valves are dirty or worn.	Check, clean or replace.
The sleeves or plungers are leaking.	Check, clean or replace.
The drive belt is slipping.	Check, re-tension, or replace.

Not enough water from the spray lance nozzle

Cause	Solution
Blocked filters.	Clean the filter and/or nozzle.
Freewheel return valve open.	Close the freewheel return valve.
Spray lance nozzle blocked.	Clean the nozzles.

Water in oil

Cause	Solution
Very high air humidity.	Check and replace the oil twice as often.
Worn plunger seals and oil seals.	Check and replace.

Pump is leaking water

Cause	Solution
Worn plunger or seals.	Check and replace.
Worn plunger guide O-rings.	Check and replace.

Pump is leaking oil

Problem	Solution
Oil level too high.	Check and correct the level.
Worn oil seals.	Check and replace.

Drive engine is not starting

Cause	Solution
Engine will not start.	See the Honda engine manual.
The engine suddenly stops.	See the Honda engine manual.

The drive engine stops operating

Cause	Solution
	See the Honda engine manual

Water temperature too low

Cause	Solution
No diesel.	Fill the diesel tanks.
Setpoint temperature too low.	Adjust the setpoint of the thermostat (JUMO)
Engine speed too high.	Lower the engine speed.

No current

Cause	Solution
The dynamo is not working – the charging lamp is illuminated.	Check for power on the charging circuit; inspect the dynamo fuse; replace the dynamo if necessary.
The drive belt of the dynamo is slipping.	Tighten the drive belt.

11.2

Technical support

If the tips provided in this chapter do not solve your question or problem, please contact your local dealer.

11.2.1 Local dealers

For a complete list of Empas distributors and local service departments, please refer to the website of Empas on the internet : [dealerlocator online](https://www.empas.nl/en/service/dealers) (<https://www.empas.nl/en/service/dealers>).

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Appendices

EC declaration of conformity



EU DECLARATION OF CONFORMITY

Trade name

Empas BV

Address

Kruisboog 43, NL-3905 TE Veenendaal, The Netherlands

Product description

Stand-alone hot water unit for weed management

Model

MCB 12-150-500

MCB 12-150-800

MCB 12-150-1000

Applied directives and standards

Directives

2006/42/EC (Machinery)

2014/30/EU (EMC)

2000/14/EC (Noise emission)

Standards

NEN-EN-ISO 12100

NEN-EN-IEC 60204-1

NEN-EN-ISO 3744

Additional information

- This declaration of conformity is issued under the sole responsibility of the manufacturer.
- The technical construction file was compiled by Empas.
- The pressure equipment is manufactured in accordance with sound engineering practice (max. operating temp. 110 °C).
- This declaration pertains exclusively to the machine from Empas. Possible installation of the machine on a vehicle falls outside the responsibility of Empas and is not covered by this declaration.
- Noise emission in accordance with internal control of production as referred to in annex V.
 - measured sound power level: 76 dB(A)
 - guaranteed sound power level: 80 dB(A)

Declaration

We hereby declare that the aforementioned product conforms to the applicable requirements of the directives and standards specified in this declaration.

Name / Position:
H.G. Doornenbal,
director

Date:

12/ 07/ 2017

Signature

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Table for MC210 water softener

Table for the amount of water softener you should use in milliliters (ml)

dH of water in the tank	Tank capacity in the tank				
	500	700	800	1000	1500
1	10 ml	13 ml	15 ml	19 ml	29 ml
2	19 ml	27 ml	30 ml	38 ml	57 ml
3	29 ml	40 ml	46 ml	57 ml	86 ml
4	38 ml	53 ml	61 ml	76 ml	114 ml
5	48 ml	67 ml	76 ml	95 ml	143 ml
6	57 ml	80 ml	91 ml	114 ml	171 ml
7	67 ml	93 ml	106 ml	133 ml	200 ml
8	76 ml	106 ml	122 ml	152 ml	228 ml
9	86 ml	120 ml	137 ml	171 ml	257 ml
10	95 ml	133 ml	152 ml	190 ml	285 ml
11	105 ml	146 ml	167 ml	209 ml	314 ml
12	114 ml	160 ml	182 ml	228 ml	342 ml
13	124 ml	173 ml	198 ml	247 ml	371 ml
14	133 ml	186 ml	213 ml	266 ml	399 ml
15	143 ml	200 ml	228 ml	285 ml	427 ml
16	152 ml	213 ml	243 ml	304 ml	456 ml
17	162 ml	226 ml	258 ml	323 ml	485 ml
18	171 ml	239 ml	274 ml	342 ml	513 ml
19	181 ml	253 ml	289 ml	361 ml	542 ml
20	190 ml	266 ml	304 ml	380 ml	570 ml
21	200 ml	279 ml	319 ml	399 ml	599 ml
22	209 ml	293 ml	334 ml	418 ml	627 ml
23	219 ml	306 ml	350 ml	437 ml	656 ml
24	228 ml	319 ml	365 ml	456 ml	684 ml
25	238 ml	333 ml	380 ml	475 ml	713 ml