

Hot water unit MCE

Operator Manual

2018-08-30
Version 1.0
Original instructions



Thermal Weed Management

Preface

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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 26](#).

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	2018-08-30	Original edition

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

The MCE is based on a three-wheel mobile chassis that carries the unit. You can move the unit manually.

MCE



The machine can take its water supply directly from a tap water supply, using a hose. The unit has a standard garden hose connector for that purpose. A standard garden hose must be supplied by the user.

A high-pressure pump delivers the water through the water heating unit to the spray unit. The spray volume is set at 9 liters per minute with a maximum pressure of 110 bar.

The Hot water unit can heat the water up to 102 °C. The temperature can be set by the user. The Hot water unit has three spray heads:

- A pourhead
- A dirt blaster
- A high-pressure nozzle.

Weed control

The pourhead is a low-pressure spraying nozzle, especially intended for spraying a specified area with boiling hot water (for weed control).

High-pressure cleaning

The high-pressure nozzle and the dirt blaster are high-pressure nozzles for surface cleaning with hot or cold water. The pressure is set at 110 bar bar.

2.2

Specifications

MODEL: MCE	
Water temperature	Maximum 102 °C
Water flow rate	Maximum 9 liters per minute
Capacity tank depending on type	No tank - water supply by hose
Capacity of the boiler	≈ 64 kW
Diesel consumption	≈ 6 liters per hour
Diesel tank capacity	≈ 23 liters
Weight of the MCE	≈180 kg
Electrical connection rating	≈ 2 kW

2.3

Options

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

- Ergotool
- Spray tube
- Spring-retractable reel
- Manually operated reel
- Ultrasonic decalcifier

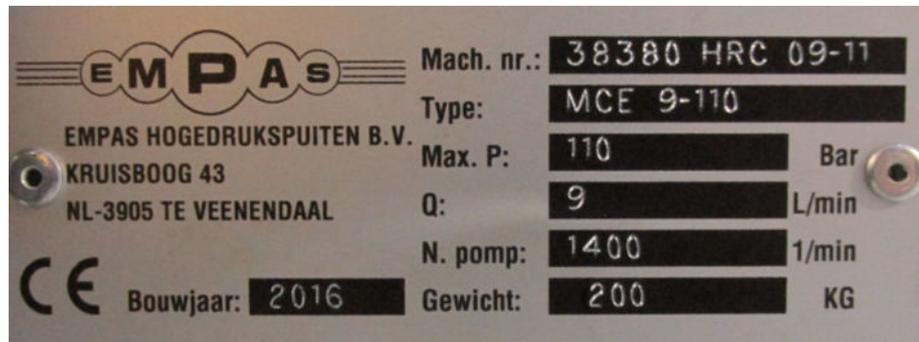
Refer to the [Empas website on page 6](#) for more information or ask your dealer.

2.4

Inscription plate data

The type plate is on the back side of the machine. The type plate shows the basic identification and specifications (see [Specs MCE on page 18](#)) of the machine.

Type plate



Item	Meaning
Mach.no.: 38380 HRC 09.11	38380 : Machine serial number HRC 09-11 : Pump type
Type: MCE 9-110	MCE : type of hot water machine
Q	9 L/min : maximum water flow
Max. P	110 Bar : spray lance pressure
N. pomp : 1400	1400 rpm : speed of the pump
Gewicht : 200	200 KG: Weight of the machine
Bouwjaar: 2016	2016: Year built

3

Safety

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 MCE.
- 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 Electrical

Precautions to be taken when working with electrical equipment:

- Consider all circuits live until you have personally turned off the power and unplugged the mains cable plug.
- 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.

3.2.3 Chemical

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

3.2.4 Pressure

3.2.5 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.

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 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.



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 main switch key to the OFF position before you open the safety cover.

Safety cover



1. Safety cover

2. Eye nuts (suspension)

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 of the water to prevent the boiler from overheating. When there is no water flow the fuel to the boiler is switched off. The burner of the boiler stops burning. The green light of the [Burner on/off] switch [extinguishes on page 34](#).

3.3.4 Pressure sensor

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

minimum value. When the fuel flow is switched off the green light of the [Burner on/off] switch [extinguishes on page 34](#).

3.3.5 Unloader (Pressure regulator)

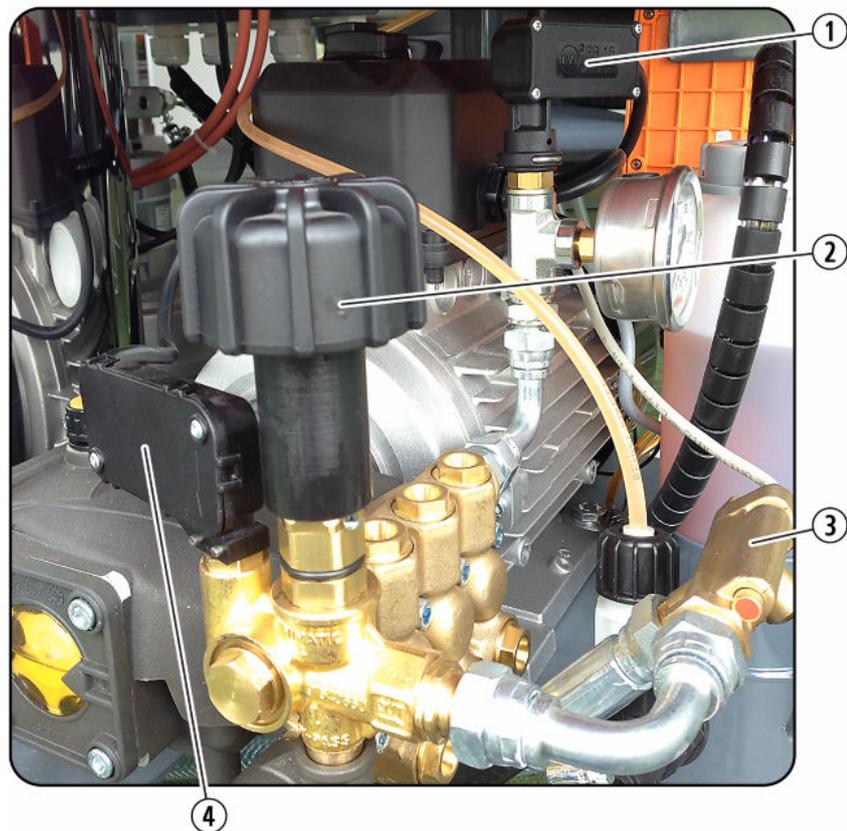
The unloader or pressure regulator has two functions.

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

The pressure regulator is used to set the working pressure. By default the pressure is 110 bar. 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.

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

The unloader, the flow switch and the safety valves



1. Pressure switch (minimum system pressure)

3. Flow switch

2. Unloader

4. Pressure switch (pump)



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.

Caution hot surfaces



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:

- A water softener unit.
- High-pressure pump with an electric motor
- Water heating unit with boiler, heated with diesel
- Spray lance (optional with a delivery hose on a reel)
- Control system.

4.1.1 Water supply

The machine can take its water supply directly from a tap water supply, using a hose. The unit has a standard garden hose connector for that purpose.



Warning

De maximum permissible supply water temperature is 50° C.

The water coupling is at the rear. See [Fig - Rear side \(MCE\) on page 32](#).



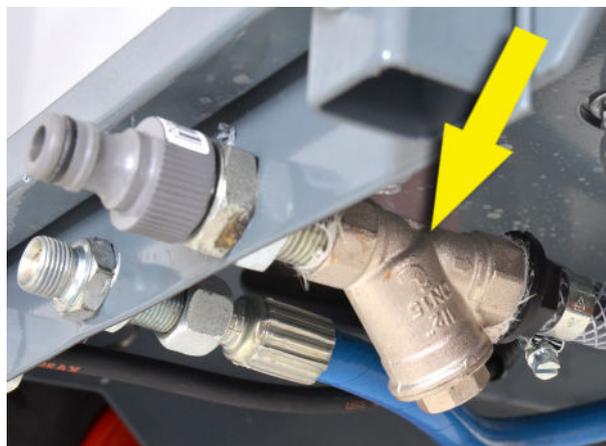
Warning

The flow rate of the main water supply must always be higher than 9 liters per minute. If the water supply is not higher than 9 liters per minute, there is a water supply shortfall. This can damage the pump.

4.1.1.1 Water filters

There is a water filter at the bottom of the unit. The water from the supply hose goes through this filter.

The water filter



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 or by an ultrasonic decalcifier. A water softener tank with automatic dosing is standard on the MCE. An Ultrasonic decalcifier is optional.

The amount of water softener is dependent on the hardness of the incoming tap water. You can test the hardness of the water with a test strip. You can order test strips and water softener directly from your machine supplier (the manufacturer or importer). The water softener MC210 is recommended by the manufacturer.

The automatic dosing adds water softener to the water. The amount of water softener must be set with the stroke speed knob on the pump. See [Determine the water softener dosage on page 46](#) for the correct dosage.

The stroke speed knob of the softener dosage



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.



Note

Make sure there is enough water softener in the water softener tank.

4.1.2 High-pressure pump with drive engine

A high-pressure pump delivers the water through the water heating unit to the spray unit. The spray volume is set at 9 liters per minute with a maximum pressure of 110 bar.



Caution

Do not let the pump run without water supply. This will damage the pump.

4.1.2.1 Drive engine

An electric motor drives the high-pressure pump.

4.1.3 Water heating unit

The water heating unit has a spiral heating unit with a maximum rating of [64 kW on page 34](#).

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 top side.

4.1.4 Spray lance and high pressure hose

The Hot water unit has a spray lance with a high-pressure hose. A hose reel is optional.

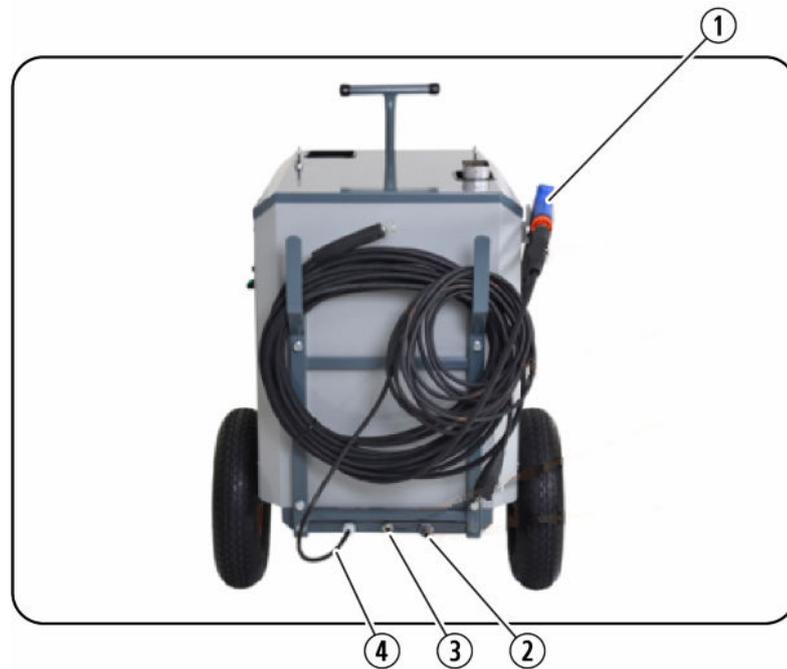


Note

The spray lance can be used for weed control and high-pressure cleaning.

4.1.5 Overview

Rear side



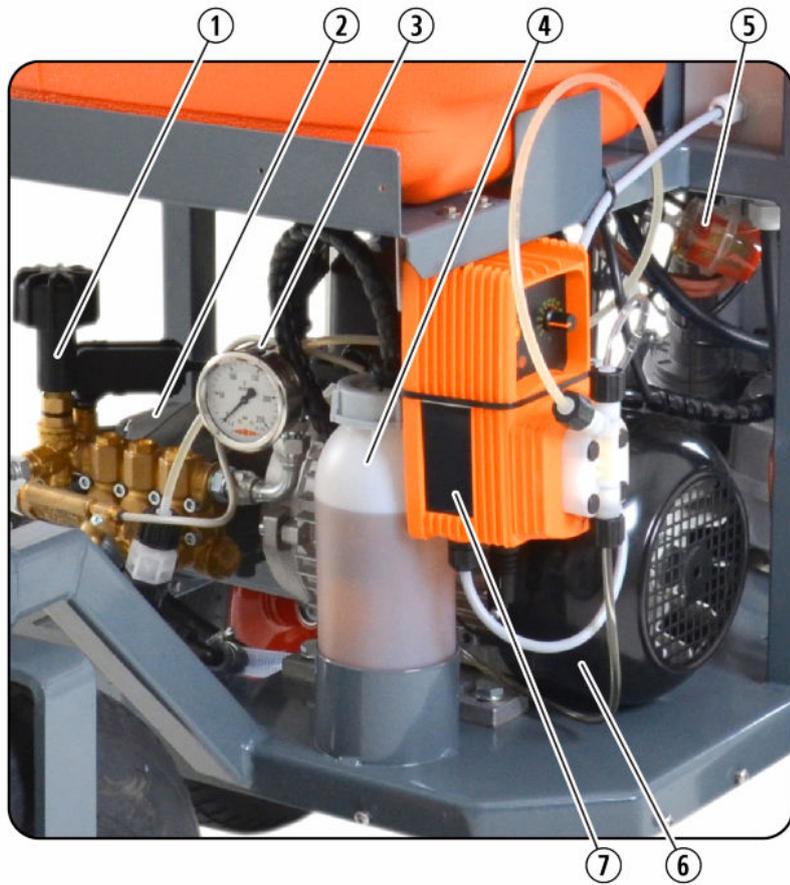
1. Spray lance and hose

2. Water coupling

3. Spray lance coupling

4. Power cable

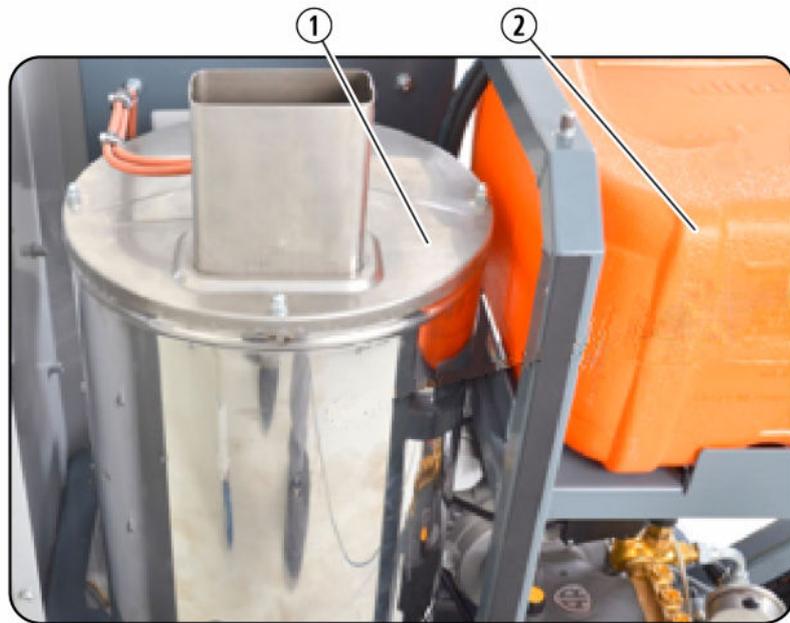
Interior



- 1. Unloader (Pressure regulator)
- 2. Pump
- 3. Manometer
- 4. Water softener supply tank

- 5. Fuel filter
- 6. Electric motor
- 7. Water softener dosing system

The fuel tank and the boiler



1. Boiler

2. Fuel tank



Warning

Heating oil and biodiesel can not be used for the burner kettle.

4.2

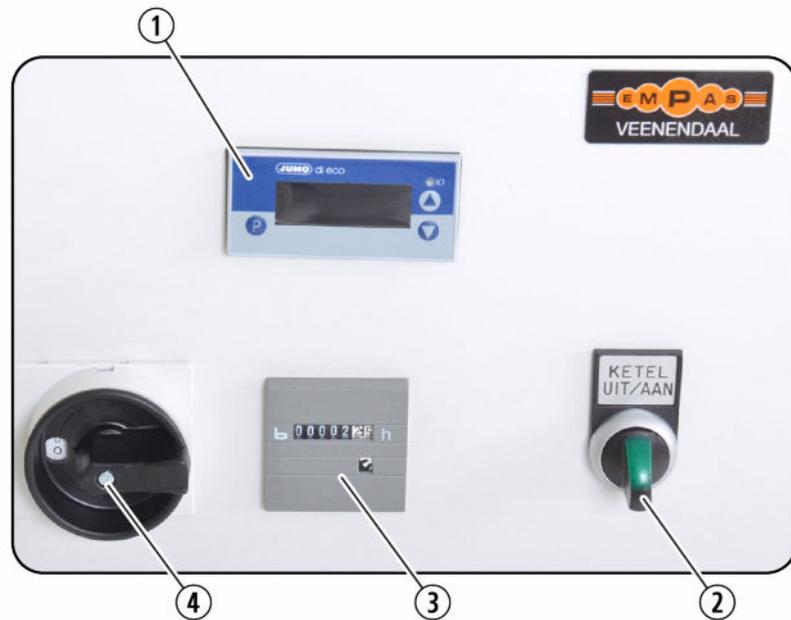
Control components

4.2.1 Engine controls and control panel

The control panel is on the left side of the machine.

The control panel has two switches (2 and 4) and indicators for temperature (1) and operating hours (3). The [**Burner on/off**] switch (2) also has a green indication light.

Control panel



- | | |
|---|-----------------|
| 1. Thermostat (JUMO) | 3. Hour counter |
| 2. Burner on/off switch (with indication light) | 4. Main switch |

The main switch (4) switches the pump **ON** and **OFF**.

The temperature indicator or thermostat (1) displays the temperature of the water on the supply side of the water heating circuit. It can also be used to set the working temperature.

There is only power supply to the heating unit (burner and fan) when the **[Burner on/off]** switch (2) is in the **ON** position. The main switch must be in the **ON** position. When the burner is **OFF** the green light is out.

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 Unloader

The unloader is used to set the water pressure. By default the pressure is 110 bar. 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.

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.

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.

6

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.

7

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).

8

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.

8.1

Plan your tasks

Make sure you have enough fuel available on the job.

Make sure you have enough water softener (MC210) available on the job.

8.2

Prepare for operation



Caution

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



Caution

Insufficient water supply damages the high-pressure pump.

1. Make sure:

- There is sufficient fuel in the tank for the water heating unit for the [planned task on page 43](#)
- There is sufficient [water supply on page 29](#) from the tap
- There is sufficient MC210 in the [water softener supply tank on page 48](#).

2. Test the water hardness with a [test strip on page 47](#).

8.2.1 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 50](#).
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.

The opening in the cover to fill up the diesel tank.



Fuel filler cap



8.2.2 Water supply

The Hot water unit has no water tank. The system takes its water supply directly from a tap water supply. Connect the standard garden hose to the water coupling at the bottom of the frame at the rear. The water coupling is at the rear.

Couplings at the rear side



1. Plug power cable

3. Spray lance coupling

2. Water coupling



Caution

De maximum permissible supply water temperature is 50° C.



Warning

The flow rate of the main water supply must always be higher than 9 liters per minute. If the water supply is not higher than 9 liters per minute, there is a water supply shortfall. This can damage the pump.

8.2.3 Determine the water softener dosage



Note

Make sure there is enough water softener in the water softener tank.

**Note**

Determine the water softener dosage each time the water supply location changes.

The automatic dosing adds water softener to the water. The amount of water softener must be set with the stroke speed knob on the pump. Remove the cover of the Hot water unit to get to the stroke speed knob of the water softener pump. (See [Safety cover on page 24](#)).

The stroke speed knob of the softener dosage



The amount of water softener is dependent on the hardness of the incoming tap water. You can test the hardness of the water with a test strip. You can order test strips and water softener directly from your machine supplier (the manufacturer or importer). The water softener MC210 is recommended by the manufacturer.

The standard dosage setting is just under 10 %. The water softener pump adds approximately 100 ml per hour to the water. This setting is for a water hardness lower than 10 dH. Adjust the dosage setting when the water hardness is higher according to the following list.

Water hardness	Dosage setting
[°dH]	[%]
7	9
10	13
14	18
20	25

Test strips water hardness



8.2.4 Electric power supply

The Hot water unit needs a 230 V supply. Put the plug of the power cable in an earthed socket. Use an earthed extension cable with a splash resistant socket when you work at a greater distances from the power supply. The extension cable must have a rated capacity of at least 2 KW.

8.3

Start operation



Warning

Do not use the machine when devices, tubes, high-pressure hose and connections are not in faultless condition.

1. Insert the plug of the power cable in the mains socket.
 2. Connect the garden hose to the Hot water unit.
 3. Open the water tap.
 4. Set the main switch to ON to start the pump.
 5. Set the temperature:
 - a) Turn off the **[Burner on/off]** switch for cleaning with [cold water on page 34](#).
 - b) Or: set the temperature with **[up/down]** buttons on the [thermostat on page 34](#).
 6. Switch the burner ON to operate with hot water. See [Operate with hot water on page 50](#).
 7. Direct the spray lance at the object to be cleaned or at the weed.
 8. Press the lever on the hand spray unit.
-



Note

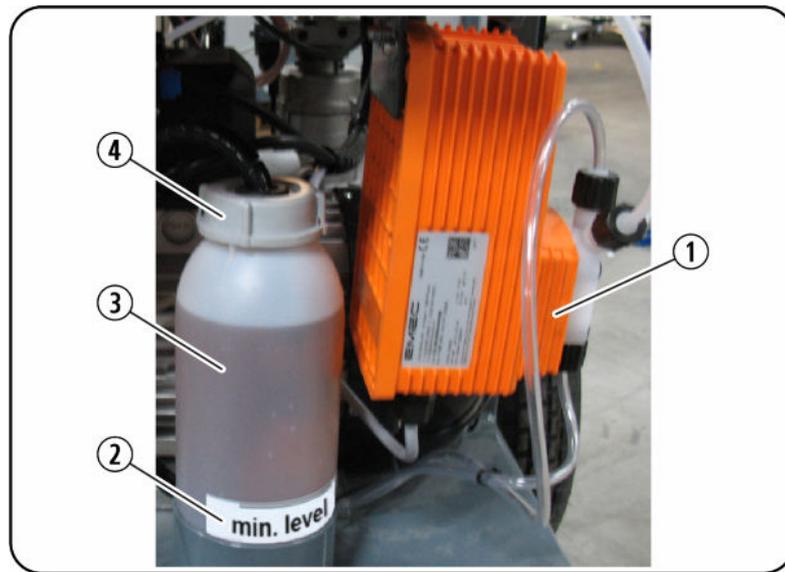
To keep the water temperature stable spray for longer periods at one time. Only when the lever on the hand spray unit is pressed and there is a water flow the burner kettle will burn. So do not spray each plant individually.

8.4

Add water softener to the supply tank

1. Make sure the Hot water unit is [switched off on page 50](#).
2. Open the safety cover.
3. Take out the water softener tank.
4. Open the cap of the water softener tank.
5. Fill the tank with water softener MC210.
6. Close cap of the water softener tank.
7. Close the safety cover.

Water softener tank



1. Water softener pump

2. Minimum level indication

3. Water softener tank (MC210)

4. Cap of water softener tank

8.5

Stop operation



Warning

Do not turn the main switch off when the boiler is ON and the spray water is hot. There will remain pressure on the system. This can cause damage to the boiler.

1. Turn the [burner switch to the off position on page 34](#).
2. Spray for at least 30 seconds to cool down the boiler
3. Make sure the temperature is lower than 50 °C.
4. Turn the main switch to the OFF position.
5. Release the lever on the hand spray unit.

8.6

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 metal parts of the spray lance, upper part water tank or exhaust.



Note

The hot water unit can also be used for cleaning.

Weed control

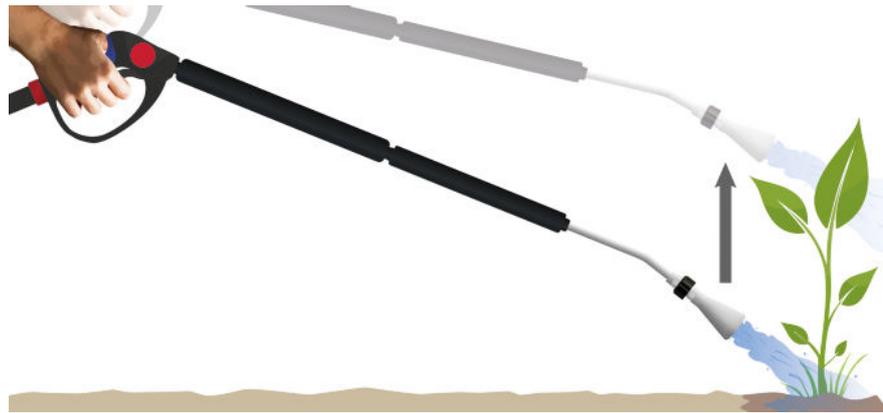
1. Unroll the hose.
 2. Install the pour head on the spray lance.
 3. Check that the temperature is set to 102 °C.
 4. Adjust the temperature when necessary with **[up/down]** buttons on the [thermostat on page 34](#).
 5. Point the spray lance at the roots or the underside of the weeds.
 6. Press the lever on the hand spray unit.
 7. Move the spray lance up.
-



Note

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

Spray lance



Cleaning

1. Unroll the hose.



Note

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

2. Install the high-pressure nozzle hand-tight and loosen it a quarter turn.
3. Set the temperature with **[up/down]** buttons on the [thermostat on page 34](#).
4. Point the spray lance at the surface to clean.
5. Press the lever on the hand spray unit.
6. Move the spray lance across the surface.

8.7

Operate with cold water

1. Unroll the hose.
2. Turn off the **[Burner on/off]** switch for cleaning with [cold water on page 34](#).
3. Direct the spray lance at the object to be cleaned.
4. Press the lever on the hand spray unit.

8.8

Take the machine out of service

8.8.1 Preserve the machine

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

Follow the next procedure to drain the water:

1. Disconnect the supply water hose from the unit.

2. Remove the water in the system. Spray for 5 seconds until the hoses are empty (spray with air)
3. Remove the high-pressure hose with the spray lance.
4. Remove the water filter (See [Rinse, clean and replace the water filter on page 57](#)) to release all the water (i.e. draining).
5. Let the high-pressure pump run for thirty seconds (without water).



Caution

Do not let the high-pressure pump run for more than 1 minute without water supply. This will damage the pump.

6. Protect the machine from rain.
7. If applicable, fill the tank with winter diesel.

8.8.2 Bring the machine back into service

1. Install the water filter (See [Rinse, clean and replace the fine and normal filter on page 57](#)).
2. Tighten all couplings.
3. Install the high-pressure hose with the spray lance.
4. Install the supply hose.

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 54](#).

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.

9.2

Preventive maintenance schedule

The following table gives an overview of all the required maintenance actions for the machine. The references in the last column refer to the appropriate maintenance procedures which are described in the next chapter.

Maintenance period	Action	Level	Reference
Daily	Global visual inspection.	Operator	See operator manual section Global visual inspection of the machine on page 57
Weekly	Check the water circuit for leakage.	Operator	
After first 100 operating hours	Replace the oil of the high pressure water pump.	Service engineer	Contact your local dealer on page 6

Maintenance period	Action	Level	Reference
After 300 operating hours	Perform boiler maintenance.	Service engineer	Contact your local dealer on page 6
	Major inspection of the water circuit.	Service engineer	Contact your local dealer on page 6
	Replace the oil of the high pressure water pump.	Service engineer	Contact your local dealer on page 6
	Major inspection of the high pressure water pump.	Service engineer	Contact your local dealer on page 6
	Perform high pressure water pump maintenance.	Service engineer	Contact your local dealer on page 6
	Perform electrical maintenance.	Service engineer	Contact your local dealer on page 6
	Check the accessories.	Operator	
Annual	Check the pictograms.	Operator	See operator manual section Check the pictograms on page 58 .
	Complete global inspection.	Service engineer	Contact your local dealer on page 6

9.3

Maintenance by the service department

Any maintenance not mentioned in section [Operator maintenance on page 53](#) of the operator manual may only be carried out by:

- employees of Empas,
- persons trained and authorized by Empas.

In both cases, any minor defect or fault can be rectified immediately.

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 water filter

1. Unscrew the filter cap.
2. Remove the filter.
3. Rinse the filter.
4. Replace the filter when damaged (article number 24.05.041).
5. Install the filter.
6. Install the filter cap and screw it tight.

The water filter



10.4

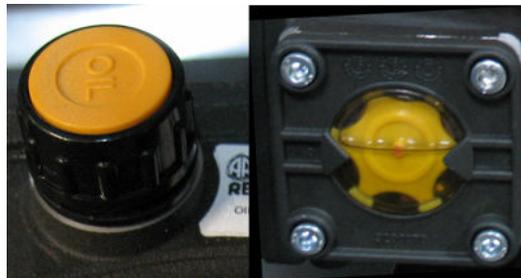
Check the pictograms

1. Make sure all [safety signs on page 26](#) are firmly attached.

10.5

Check the oil level of the high-pressure pump

1. Stop the machine.
2. Make sure the machine 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

Troubleshooting

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
Insufficient supply.	Check the delivery.
Possibly a high-pressure pump fault.	1. Check the functioning 2. Do maintenance 3. Contact your local dealer on page 6
Blocked filter.	Clean the filter.

Insufficient pressure

Cause	Solution
The pump is not bled properly.	Bleeding (removing any air). Check the delivery.
The pump is sucking air.	Inspect the supply hose and couplings.
Supply is blocked.	Inspect the water filter.
The valves are dirty or worn.	Check, clean or replace.
The sleeves or plungers are leaking.	Check, clean or replace.

Not enough water from the spray lance nozzle

Cause	Solution
Blocked filters.	Clean the filter and/or nozzle.
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.

The drive engine stops operating

Cause	Solution
	Contact your local dealer on page 6

Water temperature too low

Cause	Solution
No diesel.	Fill the diesel tanks.
Setpoint temperature too low.	Adjust the setpoint of the thermostat (JUMO)

No current

Cause	Solution
Power cable not connected.	Insert the plug of the power cable in the mains socket

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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EC declaration of conformity



EU-CONFORMITEITSVERKLARING

Handelsnaam

Empas BV

Adresgegevens

Kruisboog 43, NL-3905 TE Veenendaal, Nederland

Productomschrijving

Compacte heetwater unit voor onkruidbeheer 230V

Model

MCE 9-110

Toegepaste richtlijnen en normen

Richtlijnen

2006/42/EG (Machines)

2014/30/EU (EMC)

2014/35/EU (Laagspanningsrichtlijn)

2000/14/EG (Geluidsemissie)

Normen

NEN-EN-ISO 12100

NEN-EN-IEC 60204-1

NEN-EN-ISO 3744

Additionele informatie

- deze verklaring wordt verstrekt onder volledige verantwoordelijkheid van de fabrikant
- het technisch constructie dossier is samengesteld door Empas
- de drukapparatuur valt onder regels goed vakmanschap (TSTS < 110° C)
- geluidsemissie conform interne fabricagecontrole als bedoeld in bijlage V
 - gemeten geluidsvermogensniveau: 78,3 dB(A)
 - gewaarborgd geluidsvermogensniveau: 80 dB(A)

Verklaring

Hierbij verklaren wij dat bovenstaand product voldoet aan de van toepassing zijnde eisen van de in deze verklaring genoemde richtlijnen en normen.

Naam / Functie:

H.G. Doornenbal,
directeur

Datum:

12/ 07/ 2017

Empas BV
Kruisboog 43
NL-3905 TE Veenendaal
+31 (0) 318 525888
www.empas.nl

Handtekening

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

