

# Operation and Maintenance Manual Villagepump 500 Standard

Villagepump 500 Standard, the leading solution for producing clean drinking water without the need of any external energy source.



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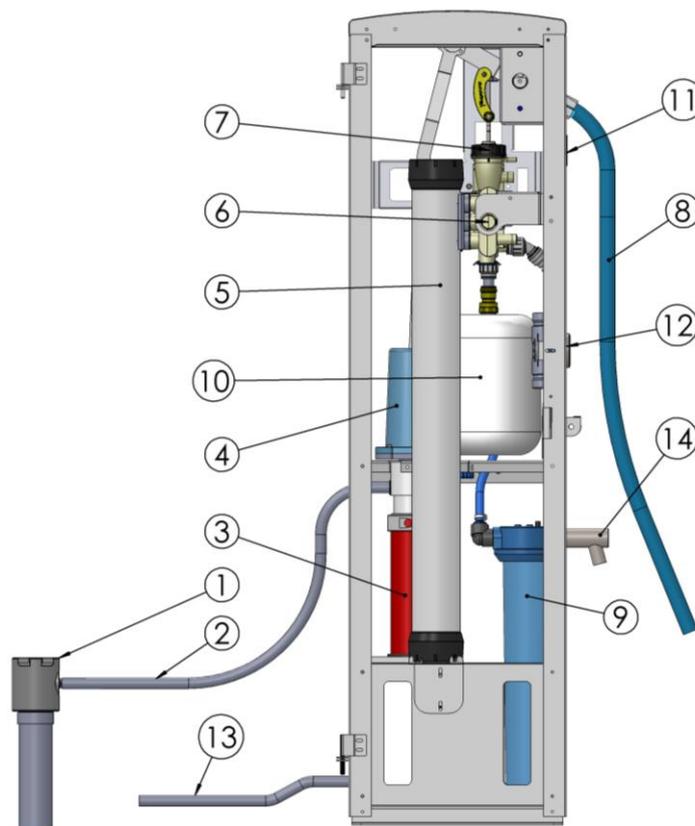
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## 1 Introduction

The *Villagepump 500* yields up to 500 litre of fully purified drinking water an hour, meeting WHO standards regarding the removal of bacteria's, viruses and turbidity. This manual - version 1.8, June 2019 - is meant for Villagepump 500 with serial number **VP500S-07-XXXXXX-XXX** – series 7 or higher, manufactured at March 31, 2017 or later

Schematic drawing of the Villagepump 500 Standard.



1. Mesh Filter (0,05 mm)
2. Inlet Hose
3. Feed Pump
4. Equalizer
5. Ultrafiltration (UF) membrane
6. Valve
7. Disinfectant dispenser
8. Pump Handle
9. Activated Cartridge (optional)
10. Pressure Vessel (back wash buffer)
11. Backwash pressure indicator (manometer)
12. Water Meter
13. Drain Hose
14. Tap

## 2 Unpacking and handling

The installation of the Villagepump should be performed by at least 2 people to move and install the Villagepump properly and safely.

Required tools for installation (this tools are included in standard delivery):

- open-end wrenches (10/11, 12/13, 16/17)
- screwdriver flat 4 - 6 mm
- Allen keys 3, 4 and 6 mm

In case of any doubts or questions, please contact your local distributor or via [info@villagepump.org](mailto:info@villagepump.org).

The standard package includes the following components:

- Villagepump
- Pump Handle (blue)
- Mesh Filter
- Foot Plate
- Drain Hose, length 1 meter
- Inlet Nose, length 10 meter
- Padlock
- Chlorine Dioxide tablets (120 pcs of 1 gr)
- Tool Set (Allen keys, wrenches, special tool)
- Grease (Silicon Compound)
- Hose Nipple and Hose Clamps (3x)
- Floater and Tie Wrap
- Spacers length 3 cm
- M8 bolt for mounting Pump Handle (2x)
- Self-locking M8 nuts and rings (4x)
- Manual

And optionally:

- Activated Carbon filter cartridge 2,5 x 20"

For specific client related reasons this standard configuration might have been changed.



*Standard packaging Villagepump 500*



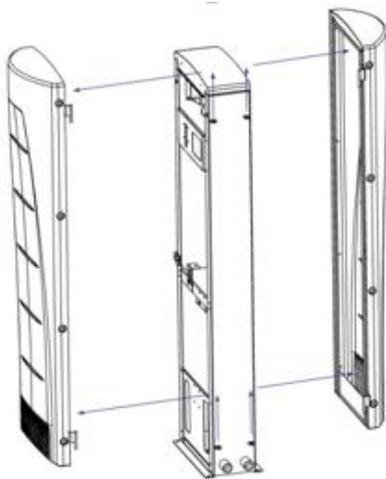
*120 tablets of 1 g Chlorine Dioxide*

The Villagepump is strapped onto a pallet further protected by a cardboard box.

- Open the box at the upper side and take out carefully any loose parts;
- Remove the packaging from the pallet and ensure environmentally friendly disposal;
- Unpack the remaining loose (spare) parts like Pump Handle, Activated Carbon cartridge (optionally), Foot Plate, Mesh Filter, Hoses, agreed spare parts etc.
- Untie the Villagepump from the pallet and put the Villagepump carefully upright on a stable, flat surface;
- Remove the tie-wrap that locks the Villagepump and remove the plastic bag.
- Unlock the cover (at the right sight) by pushing down the small handle; unpack the loose parts that are stored inside the Villagepump like the Floater, Toolset, Manual, Fasteners, ClO2 tablets etc.
- Remove both white plastic covers. Without these covers the Villagepump is easier to pick up and move. The covers can easily be lifted vertically from their hinges. One cover (the right one) is locked on the outside, the other cover (the left one) is locked from the inside. First open the cover that is locked on the outside, enabling you to unlock the other cover.



*Internal lock of one cover; unlocking the covers by lifting the covers from the hinges;*



- Move the Villagepump always with at least two people and use the tap and the centre console as targets.



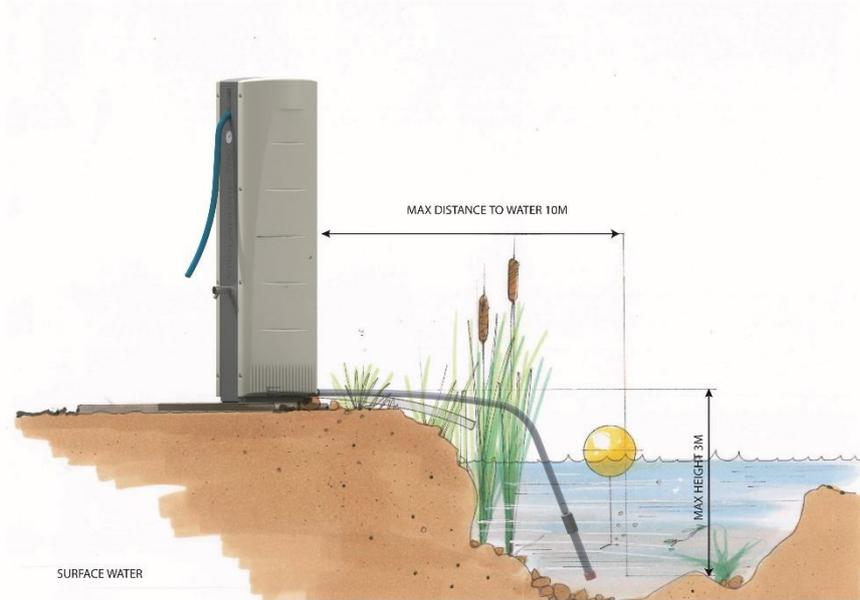
*To move the Villagepump, please use tap and centre console.*

### 3 Installation Villagepump 500 Standard

The Villagepump 500 Standard is suitable for low till average polluted surface water, rainwater harvesting, ponds and streams.

Please note:

- the bottom of the Villagepump should be mounted not more than 3 meters above the water level (maximum static head of 3 meter);



- Install the Villagepump on a flat, hard (concrete, metal, wood) smooth and level surface, with a minimum size of 60 by 120 cm. Sometimes the wooden pallet can be used for this purpose!
- A Foot Plate / Installation Frame is delivered together with the Villagepump 500 Standard, with the studs (M8) at the right position (distance 40 x 25 cm).
- This footplate should be mounted on a sturdy, flat floor or can be moulded in a cement or concrete base. If you choose this option, please take care that the bolts are at least 35 mm above the surface of the cement/concrete base.



Installation Plate / Foot Plate with four M8 rods

- Apply the supplied spacers (length 2 cm) to the studs / bolts; place the Villagepump over the studs / bolts and secure it with four self-locking M8 nuts. The Villagepump is now firmly anchored to the floor.

## 4 Preparing for first use

Once installed the *Villagepump 500 Standard* has to be prepared for first use.

- Mounting Pump Handle and adjusting the Feed Pump (see par 4.1)
- Connect Inlet Hose and Drain Hose (see par 4.2)
- Connect Mesh Filter to Inlet Hose (see par 4.3)
- Install Activated Carbon (AC) cartridge (optionally)

**Please note: the UF membrane has been filled with Glycol so do not drink the first 100 liter water. And install the AC cartridge only after the Villagepump has been used already for at least 2 back wash cycles (see par 5.5) to be sure the preservative liquid (Glycol) has been removed from the UF membrane.**

### 4.1 Mounting Pump Handle and adjusting the Feed Pump

The blue Pump Handle is packed separately and has to be mounted.

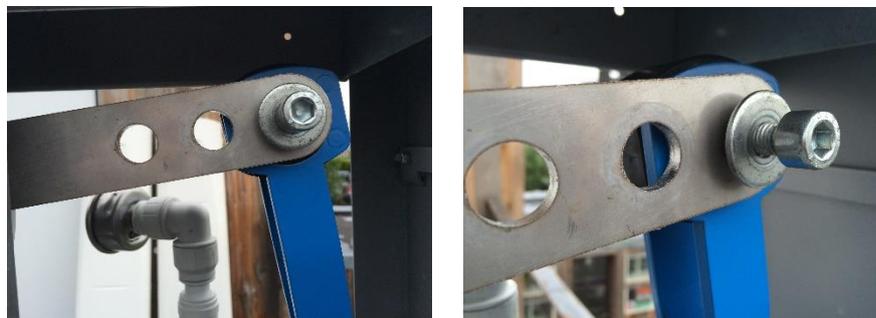
- Unpack the Pump Handle and put the Pump Handle in the aluminum block.



*Mounting pump handle*

- Attach the Pump Handle firmly with 2 supplied bolts (use 5 mm Allen key).
- Pump a few strokes and check the bolts.

At installation, the Fork of the Feed Pump is mounted usually at the first hole of the lever (closest to the handle) This leads to the lightest way of pumping and is recommended for normal use.



*Fork installed at third hole of lever.*

If the distance (static head) between Villagepump and water level is 3 meters or higher, we recommend to put the Fork on the second or third hole. The Feed Pump will create a higher vacuum and more water can be primed from a higher level, but pumping will be heavier.

## 4.2 Connecting Inlet Hose and Drain Hose



inlet (A) and drain (B)

### Connecting the Inlet Hose (A)

The Inlet Hose is directly connected to the Feed Pump, through a hole in the frame.

- Put the Inlet Hose through the hole and put the Hose Clamp on the hose.
- Push the Inlet Hose from outside over the nipple as far as possible.



- Shift the Hose Clamp at the right spot and connect the Hose Clamp firmly!

**Note:** be aware that this connection should be completely air-tight because the Feed Pump operates with a vacuum.

**Note:** keeping the Inlet Hose out of full sunlight will extend the life time. We recommend to bury the Inlet Hose in the ground or cover the hose with sand or other materials

### Connecting drain hose (B):

- Mount the Hose Nipple to the plastic part inside the Villagepump firmly.
- Fit the Drain Hose (1 meter length is delivered standard) as far as possible on the Hose Nipple and connect the hose firmly with a hose clamp (B).

### 4.3 Connecting Mesh Filter

**Note:** shorten the Inlet Hose to the minimal length needed, especially when the water level is 3 or more below the level of the Villagepump. The Hose is reinforced so you will need a pincers

- Fit the Inlet Hose to the Mesh Filter using a Hose Clamp and connect it firmly. Check carefully if the Mesh Filter is really connected well!

**Note:** please be aware that this connection should be completely air-tight because the feed pump operates with a vacuum.

- Attach the Floater to the Mesh Filter with for instance a tie wrap (included in standard delivery)
- Place the Mesh Filter in the water and make sure it is floating.



*Mounting the Mesh Filter to the hose; connect the floater to the Mesh Filter with for instance a tie wrap in order to keep Mesh Filter just below the water surface. If there is no floater available you can also use an empty can or bottle.*

### 4.4 Assembling Activated Carbon cartridge (optionally)

**Note:** Activated Carbon (AC) filter cartridge is usually not installed. If the cartridge is installed, remove AC filter cartridge before the first use. Every new UF Membrane is shipped filled with Glycol to protect it from freezing. Glycol is harmful for the AC filter cartridge. At least 2 backwash cycles are needed to be sure to dispense the UF Membrane of all Glycol.

After you have pumped for at least two backwash cycles, install the AC filter cartridge.

- Unscrew the housing from the holder (use the special wrench, included in delivery)
- Put the 20" AC filter cartridge in the housing
- Re-install the housing, take care of a proper placement of the O-ring.



*Installing AC filter cartridges: 2 x 10" or 1 x 20" (transparent housing is only for picture)*

- Fit the covers to the Villagepump by inserting them into the hinges and close it with the supplied padlock.



The Villagepump is now ready for first use! See next chapter for instructions for first use.

**Note:** be aware when the demo unit is not used for a longer time. An Activated Carbon cartridge, not used for several days or longer, could become a source for bacterial contamination because the water is standing still in the cartridge at often high temperatures. Any bacteria entering the system (for example via the tap) could grow rapidly in this circumstances. The Activated Carbon cartridge performs well, when it is used on a daily base. So when you demonstrate with the AC filter installed, be aware of this, and in case of any doubt, please replace the AC cartridge with a new one, taking off the plastic wrapper immediately before installing and preferable not touching the filter components with bare hands.

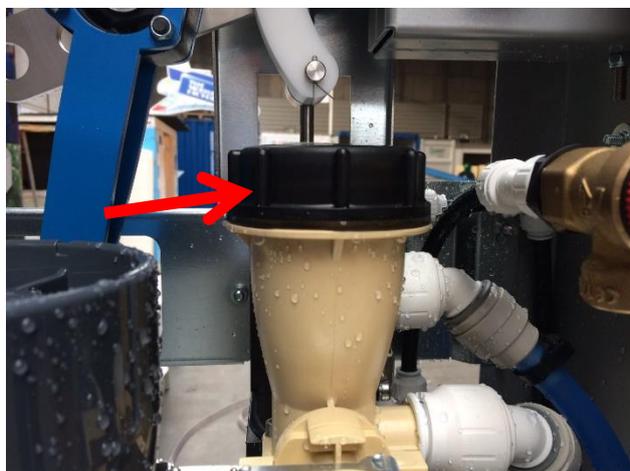
## 5 First use

### 5.1 Pumping up water first time and first backwash cycle

If the Villagepump has been installed, the Pump Handle mounted and the Mesh Filter in the water, you can start pumping. Depending on the length of the hose (and if the blue fork is on the first or second or third hole of the lever), it takes some time before the first water is coming out of the tap.

**Note 1:** do not use or drink the first 100 liter water. The UF membrane has been filled with Glycol for preservative reasons and this has to be removed first.

**Note 2:** at the start you will only pump air and this will take some time before all air has been released, especially when the hose is 10 meters or the distance to the water level is higher than 3 meters. We recommend to open now and then the black screw cap at the dispense unit to leave some air out of the system during this procedure. Also during the first backwash some water/air will come out the system (tap/drain). However after one or two back wash cycles the air should have left the system and you should have a regular flow of clean water out of the tap.



*Open Screw Cap of the dispense unit of the Valve at first time pumping up water to release the air.*

- When you start pumping, the pressure indicated on the manometer will slowly advance to about 2,9 – 3,6 bar. In normal use, this will take about 5 - 10 minutes or producing 30 to 40 litres of water.



*Manometer, indicating the pressure of the Back Wash Buffer (collecting the water for the back wash)*

- Once the pressure has reached in between 2,9 – 3,6 bar, the UF membrane is automatically flushed, the so called "backwash". At the moment of backwashing, you will notice that the indicator in the manometer is falling and water is flushed with great power through the drain hose. This back wash takes 30 – 60 secs. Do not pump during back wash.

Note: do not pump during backwash. Although not harmful for the system, water will leave the system via the pressure relief valve indicated at the picture below.



*Pressure relief valve: releases water if the pressure at the UF membrane has exceeded 0,7 bar and/or when pumping during backwash*

Backwashing takes about 30 - 60 seconds and stops automatically. The backwash has stopped once the indicator on the manometer has dropped to between 0 – 1 bar and only a trickle of water comes out of the drain hose.

- Once the backwashing is completed, you can continue with pumping and purifying water.

## 5.2 Back-wash is not working

Note: due to transport and/or storage or not using the Villagepump for a longer period it could occur that the (first) backwash is not working and the pressure reaches 4 bar or more. If the pressure reaches more than 4 bar, water will come out of the pressure relief valve with the red knob (see picture below)



*Pressure relief Valve: in operation when pressure in the system exceeds 4 bar*

If this situation occurs, please follow instructions below.

- When the pressure is reaching 4 bar, unlock the padlock, open the cover and give a gentle slab on the metal valve cover (indicated by green colour in the picture below). Usually the valve opens and the Villagepump starts back-washing. Next time the pressure should be between 2.9 and 3.6 bar.

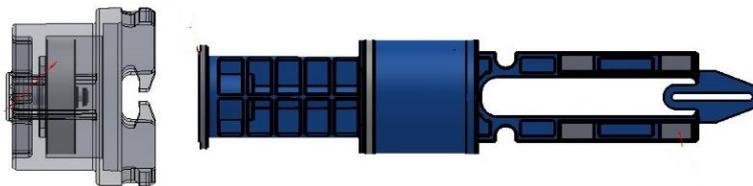
However if this does not work, follow the instructions below.

- Open the small blue valve/tap (close to the valve) to release the pressure; the barometer will go down to app. 1 bar; close the valve/tap again.
- Remove the metal valve cover, indicated by green colour in the picture below.

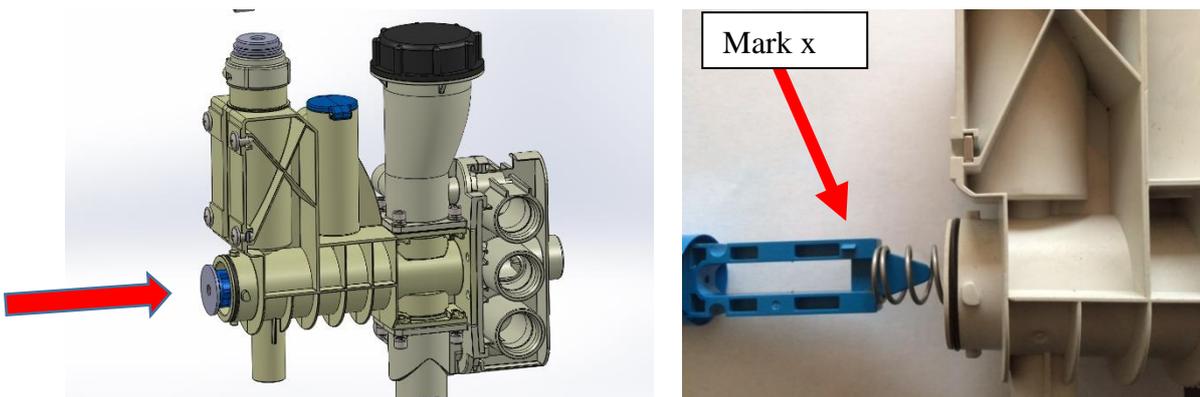


Remove the metal valve cover, open the blue tap to release pressure (and close again) and remove the transparent piston cover

- Remove the transparent piston-cover of the valve – the piston-cover is a transparent plastic part, indicated by a red arrow in the picture above – remove the cover by pushing and turning counter clockwise but be aware that the piston will come out with great force due to the spring and some water will come out!
- Disconnect the piston cover (with the magnet inside) from the blue plunger; when rust is visible either at the magnet or at the top plate of the plunger please remove, so the chances of sticking together are reduced.



- Push the blue plunger in the valve to make sure it does not stick to the cylinder wall. The plunger will come out by itself again due to the spring behind the plunger. Repeat this a few times so everything runs smoothly.



- Put the piston with the spring into the right position. Be aware that there is only one way to reposition the piston. There is a small triangular mark (see red arrow in the picture). The piston should be positioned in such a way that this mark is on top (Mark x).
- Close the piston cover: you need some power to push-in the spring and then, by turning clockwise, you can fix the piston cover. Be aware that the two small lugs of the transparent piston cover are vertically positioned so that the metal cover will fit.

**Note: be sure that the transparent piston cover is completely locked; this may take some force. This is important to avoid over stressing of the material.**

- Mount the cover plate;
- Make sure the small blue valve (pressure relieve) is closed.
- Pump water till two back-wash cycle's has been performed and the drain-valve should perform right; backwash pressure should be between 2.9 and 3.6.

## 6 Maintenance Activities

### 6.1 Preventive Maintenance Scheme

Although maintenance has been limited to a minimum, some preventive maintenance activities have to be done, as described below, also to guarantee warranty. Some activities has to be done every 4 weeks, some activities are scheduled every 12 weeks.

These intervals are based on average situations we have met in the field. Please note, due to specific local situations and due to specific user circumstances, these intervals may have to be adapted. In case of any question, please contact your local distributor or Villagepump at [info@villagepump.org](mailto:info@villagepump.org)

#### Once every 4 weeks

1. Cleaning Mesh Filter
2. Flushing UF Membrane
3. Chlorine disinfection

#### Once every 3 months

1. Replacing AC filter
2. Disinfection Pressure Vessel
3. Cleaning Flow Gauze

#### When needed

1. Chemical cleaning of UF membrane
2. Flushing Valve
3. Greasing seal Feed Pump
4. Regular water analysis

### Once every 4 weeks

### 6.2 Cleaning Mesh Filter

Clean the inox mesh filter with brush and/or soak (only) the inox part in a bath with 10- 15% acetic acid to dissolve grease or lime scale; The inox Mesh Filter can easily be dismantled by turning it counter clockwise. Check and clean – when needed - also the internal check valve (see red arrow in picture below).



*Cleaning mesh filter with brush and/or soaking filter in acetic acid*

### 6.3 Flushing UF Membrane

To avoid clogging of the UF membrane, flush the UF membrane to remove dirt from the straws, as described below. A simple activity, with high effect!

- Open the Villagepump and turn off the gray cover at the top of the UF membrane. Please be aware of the O-ring!
- Remove mud, dirt, sand etc. on the top of the straws.
- Block the hole in the top with your thumb or any other material and start pumping.
- Water will be forced through the straws from bottom to top removing the dirt in the straws. Continue for 5 – 10 minutes till no dirt is coming out of straws anymore. See picture.
- Put the grey cap back, paying attention to the position of the O-ring or when needed lubricate the O-ring with silicon compound.



### 6.4 Chlorine disinfection

To avoid fowling of the clean water part of the Villagepump, clean the system with 6 tablets of 1 g. ClO<sub>2</sub>, preferable after having done the flushing of the UF membrane (see par 6.3) in advance. When the Villagepump has not been used for one week or more, it is also recommended to disinfect the Villagepump. See the instruction video at <https://www.youtube.com/watch?v=hum-NqPftD4> or follow the instructions below.

**Warning: when the Villagepump is provided with an Activated Carbon cartridge, remove the Active Carbon cartridge so the Activated Carbon cartridge will not be affected by the disinfectant.**

- Remove the lock, open the white cover
- Remove the AC cartridge and close the AC housing (optionally)
- Be sure that there is not too much pressure in the system. If the pressure indicated on the manometer is higher than 2,5 bar, pump till a backwash cycle has been completed.
- Unscrew the black screw cap of the dispenser at the valve and put 6 tablets of 1 g Chlorine Dioxide in the dispenser. Usually 120 tablets are included in first delivery. Close the dispenser!



*Remove AC filter and add Chlorine Dioxide tablets in the dispenser*

- Stroke six times the Pump Handle slowly, with an interval of app 10-15 seconds. The tablets in the dispenser will dissolve and be spread into the system and UF membrane.
- Allow for at least 30 minutes to let the detergent soak the UF membrane, piping and valve completely. If possible extend this period up till 12 hours / one overnight.
- Pump slowly until one backwash cycle has been done – do not use this water for consumption.

## Once every 3 months

### 6.5 Replacing Activated Carbon cartridge (optional, only when installed)

**Warning: if you do not replace the AC filter cartridge every three months, there is a change of bacterial contamination;**

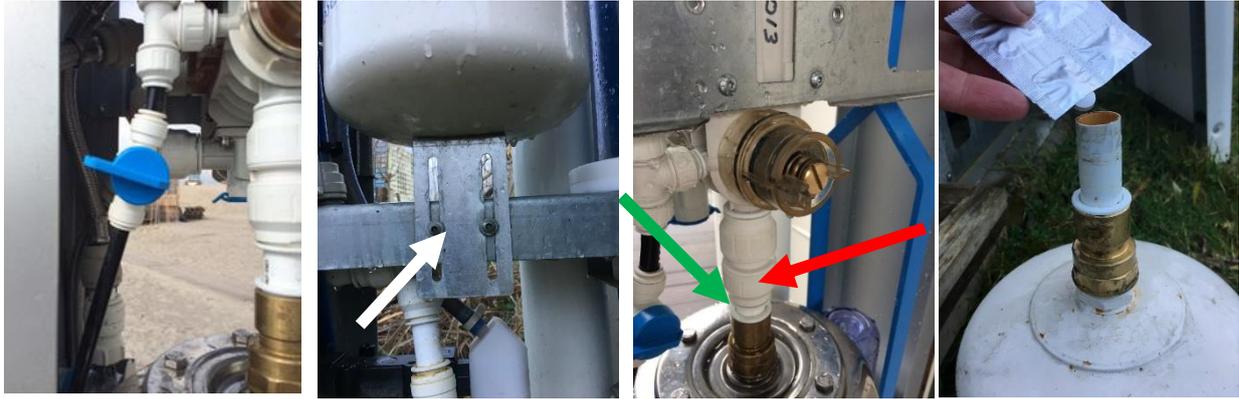
Follow the instructions below:

- Remove the lock and open the cover
- Unscrew the Activated Cartridge housing from the holder
- Replace the AC cartridge with a new AC cartridge with the following specifications: diameter 2,5" - length 20", minimal flow 450 l/h.
- Reinstall the housing on the cartridge holder
- Close and lock the cover

### 6.6 Desinfection Pressure Vessel

The Pressure Vessel is used to collect the purified water for the back-wash. We recommend to clean and disinfect the Pressure Vessel with 3 x 1 g. ChlorineDioxide tablets every 3 months.

- Release the pressure of the system by opening the small blue release valve (see picture). Close the valve.
- Dismantle the Pressure Vessel by releasing the mounting plate (see white arrow)
- Disconnect the "JohnGuest Speedfit" (= brand name) connection. You can loosen the "JohnGuest Speedfit" connection by turning the "white ring"(red arrow) a bit, push the small ring (green arrow) downwards and pull gently the Pressure Vessel downwards. It is a "trick" that needs some practise.
- Empty the Pressure Vessel.
- Put 3 x 1 g ChlorineDioxide tablets in the top of the Pressure Vessel (see picture).



Blue valve

Mounting plate

JohnGuest connection

Add 3 x 1 g ClO<sub>2</sub>

- Mount the Pressure Vessel back -including the ChlorineDioxide tablets - and start-pumping VERY SLOWLY for 3 – 4 strokes with intervals of a one minute in between, so the Chlorine Dioxide tablets have time to dissolve and move into the vessel. If you pump too fast, Chlorine Dioxide vapor will leak from the system.
- Wait a few minutes, move on with pumping till a pressure of two bar has been reached. Let it soak for 20 – 30 minutes.
- complete one back-wash cycle. Now the Chlorine Dioxide solution will be pushed in the UF membrane- wait another 15 – 20 minutes
- complete another back-wash cycle and the Villagepump is ready for use

## 6.7 Cleaning Flow Gauze

The flow gauze can be unscrewed with the special tool that is part of the toolset. You can brush the flow gauze or soak it in a bath with detergent or 10- 15% acetic acid to dissolve grease or lime scale.



## When needed

### 6.8 Chemical cleaning UF membrane

When the capacity of the Villagepump has decreased substantially, or the pumping has become hard, this could be caused by a clogged UF filter. Despite the regular automatic back-wash and the monthly flushing, this may occur especially when the raw water is polluted with biological dissolved material. The interval has to be decided based on the occurring situation, often every 3- 9 months, but for example in case of rainwater it will probably be never needed.



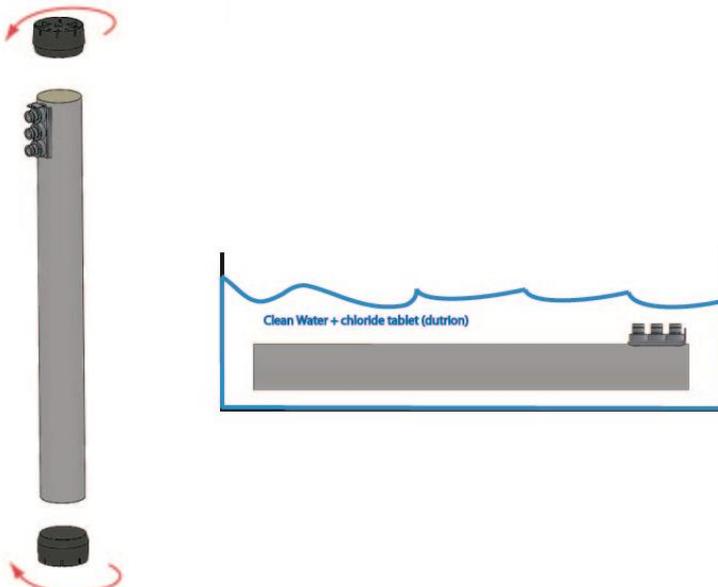
Example of dirty UF membranes that need chemical cleaning

The UF filter is resistant aggressive detergents and can be chemical cleaned and re-used again, following the instructions below.

- Open the Villagepump and dismantle the UF membrane
- Turn off the gray covers at top and bottom of the UF membrane; be aware of the O-rings in the caps.
- Remove the mud, dirt, sand etc. on the top and bottom of the straws.
- Put the UF membrane (horizontally) in a bin/container with water with dissolved chemicals like Chloride Dioxide, Sodium Hypochlorite, Sodium Hydroxide or Citric Acid. The choice for the chemical is depending on the fouling (see scheme below). However Sodium Hydroxide and/or Citric Acid are often well available and will do the job. If one solution does not yield enough result, try using a different chemical solution in succession.

Type of fouling	Chemical solution	Concentration
Biological fouling	Sodium Hypochlorite (NaOCL) Peroxide (H2O2)	500 ppm free chlorine 200 ppm
Biological fouling / Silica scaling	Sodium Hydroxide (NaOH)	max pH 12
Inorganic Salts	Citric Acid Edetic Acid (EDTA)	2 wt%
Polymers (especially HNO3)	Nitric Acid (HNO3)	till pH 2
Ferric / Manganese	Citric Acid Ascorbi Acid	1 wt% 1 wt%

- Leave the membrane for 12 hours in the bath to soak the material that is clogging the UF membrane.





*How to clean the membrane in the field? for example making a bath with chemical solution, by digging a hole in sand and cover this with a waterproof blanket.*

Now the dirt has to be removed out of the straw by flushing the UF membrane as follows.

- Remove the chemical solution as much as possible from the UF membrane to avoid being affected by the chemicals.
- Put back the grey cap at the bottom of the UF membrane and be aware of the right position of the O-ring; when needed lubricate the O-ring with silicon compound.
- Re-install the UF membrane in the Villagepump
- Block the hole in the top with your thumb (or any other material) and start pumping
- The water will be pushed through the straws from bottom to top and removing all the dirt. See picture.
- When needed repeat this procedure.



## 6.9 Cleaning system and valve

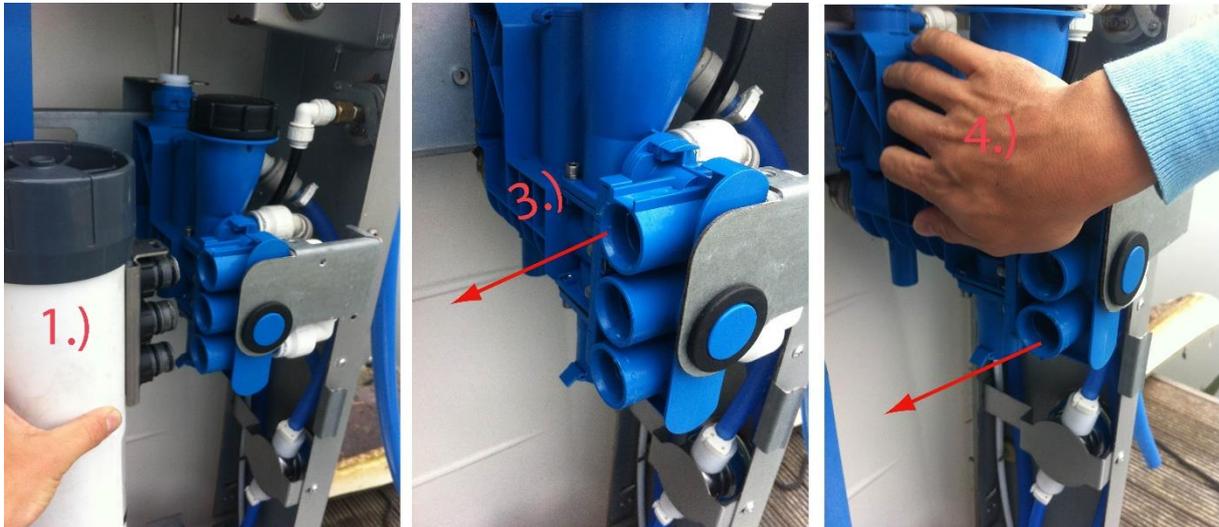
If sand or other particles has entered the system, you can clean the system and the Valve, following the instructions below:

- Clean Inlet Hose and Mesh Filter so that there are no sand particles in Inlet Hose and Mesh Filter;
- Connect the Mesh Filter to Inlet Hose and Inlet Hose to the Villagepump (check carefully if everything is connected air tight);
- Put the Mesh Filter in the water (as clean as possible);
- Dismantle and remove the UF membrane (1) - see par. 7.1;
- Start pumping up the water (without the UF membrane mounted);

The water should now come out of the valve. Most water will come out from the most upper hole/connection of the 3 holes/connections that connect the UF membrane (3).

If the water is running out of the valve, the system cleans itself.

- After a while (5 minutes), block the upper connection by putting your hand in front of the connection to stop the water, so the water should come out of the other connections. Pump for another 3 minutes. Now the Valve will be cleaned (4).
- Re-install the UF membrane.



## 6.10 Greasing Seal Feed Pump

When pumping is getting harder, and this is not caused by a clogged UF membrane, the seal of the Feed Pump should probably be greased.

- Unlock the Villagepump and open the covers
- Push the metal brace upwards and dismantle the blue fork from the white manchet/red cylinder by pulling both fork-ends outwards
- Pull the red cylinder complete downwards and remove this part from the white piston; the seal of the Feed Pump can now be accessed
- grease the seal with silicon compound (part of the standard delivery)
- put back the red cylinder, connect the blue fork and re-install the metal brace.



## 6.11 Water analysis

We recommend to carry out a water test to check the amount of Total Coli / E-coli every 6 months (see Chapter 9). Test the quality of the purified water with a certified water test for the presence of Total Coliform and E.coli (or F-coli) as described in chapter 9. If the limits are above WHO, stop using the Villagepump.

## 7 Exchanging Parts

### 7.1 Replacing UF Membrane

Replace the UF Membrane every 2 – 5 years, depending on the quality of the inlet water according instructions below.

- Remove the lock and open the cover
- Remove the hook from the valve
- Carefully pull the UF membrane out of the valve
- Carefully unpack the new UF membrane
- Remove the caps from the connectors of the new UF membrane
- Lubricate the 0-rings of the terminals with Silicon Compound (included in first delivery of the Villagepump)
- Pressure the UF membrane carefully in the block as far as the stop, the bottom side of the membrane rests on the lower console.
- Lock the membrane with hook and tighten the nut
- Carry out three back-wash cycles to remove the Glycol that is used for conservation of the UF membrane.

**Note that the AC Cartridge is removed during these first three cycles.**



*Installing UF membrane*

### 7.2 Storage of Villagepump and/or UF membrane for a longer term

When you want to put the Villagepump in storage or do not want to use it for a longer time, please note the following:

**Note: the UF membrane needs to be stored wet at all times.**

**Note: to avoid biological growth during shutdowns or storage, wet membranes could be treated with a compatible biocide. The UF membrane is compatible with many common disinfecting agents or biocidal preservatives.**

### 7.3 Replacing seal Feed Pump

Under normal conditions every two to three years the seal of the Feed Pump should be replaced. Please follow the instructions below.

- Unlock the Villagepump and open the covers

- Push the metal brace upwards and dismantle the blue fork from the white manchet/red cylinder by pulling both fork ends outwards
- Pull the red cylinder complete downwards and remove this part from the white piston; the seal of the Feed Pump can now be accessed
- Unscrew (turning counter clock wise) with the special tool (part of standard toolset) the plastic screw that keeps the seal in place



- Take off the seal; remove the O-ring, and replace by a new one and add the O-ring; grease the seal with silicon compound (part of the standard delivery)
- Mount the plastic screw with the special tool (turning clock wise) and fix the seal.
- Put the red cylinder back and put both fork ends back to the holes in the white manchet of the red cylinder.
- Push the metal bracket downwards so that both fork ends cannot move outwards anymore



## 7.4 Replacing Plunger and/or Seal Mesh Filter

A one way check valve has been integrated in the upper part of the Mesh Filter, consisting of a plunger and a spring. This check valve prevents the water in the inlet hose of flowing back.

If the plunger and/or the rubber seal has to replaced, please follow the instructions below.

- Take the Mesh Filter out of the water
- Use the special tool (part of the standard delivery) to unscrew the plastic cap
- Take out the plunger and spring, and replace when needed.



## 7.5 Replacing Pressure Vessel

The Pressure Vessel should have an internal pressure of app 1 Bar. If you doubt, please check via the air valve and release or add some air (works the same as releasing or adding air at a car tire) to bring the pressure up to 1 Bar. To access the air relief please follow the instructions for replacing the Pressure Vessel as described below.



*Air valve Pressure Vessel*

*Mounting plate*

*John Guest connection / adapter*

- Unlock the Villagepump and open the cover
- Depressurize the system by opening the blue tap; after depressurizing close the blue tap
- Dismantle the mounting plate at the bottom of the Pressure Vessel so the Pressure Vessel can be moved downwards (white arrow)
- Dismantle the John-Guest connection by turning white connector cover and push ring towards connector (red arrow)
- Dismantle the brass adaptor of the Pressure Vessel and mount (preferable with teflon tape) the adaptor to the new Pressure Vessel (green arrow)

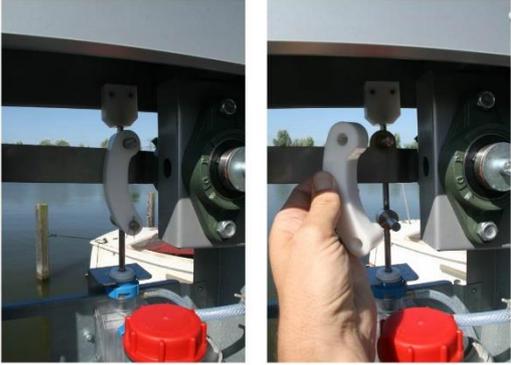
- Install the cleaned (or new) Pressure Vessel and check for possible leakages
- Re-install the mounting plate

## 7.6 Replacing Valve

The Valve is the heart and most complex part of the Villagepump. Replacing or repairing the Valve should only be carried out by trained people.

- Unlock the Villagepump and open the covers
- Depressurize the system by opening the blue tap; after depressurizing close the blue tap.
- Remove the UF membrane (see par. 6.4)
- Remove split pin and lever (1)
- Remove backwash buffer - support plate (2 screws) and backwash buffer (press white ring down first) (2)
- Remove valve cover (2 screws) (3/4)
- Remove axis by unscrewing top screws (halfway, for enough space to remove axis) (4)
- Unscrew manometer hose and unplug manometer hose (5).
- Unplug overflow hose (6)
- Remove Valve cover (2 screws) (3/4)
- Remove axis by unscrewing top screws (halfway, for enough space to remove axis) (4)
- Unscrew manometer hose and unplug manometer hose (5).
- Unplug overflow hose (6)

1



2



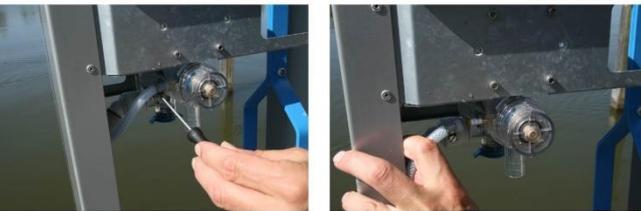
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4



5



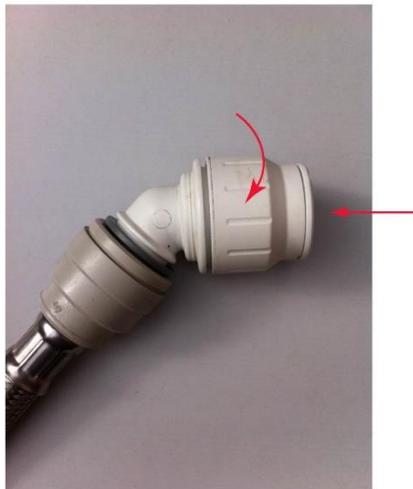
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7



8



- Unscrew valve front ( 4 screws) and back (1 screw) (7)
  - Pull out valve to create enough working space to unplug 3x main hoses (8)
  - For unplugging hoses turn white connector cover and push ring towards connector (8)
- For mounting the Valve, follow the above instructions the other way round.

## 8 Trouble shooting

### 8.1 Overview

In case the Villagepump might not function properly, in most instances this can be solved by the user.

<b>Fault</b>	<b>Required action</b>
The water does not smell fresh / bacterial pollution of the water	Replace AC filter cartridge; disinfect the system with ClO <sub>2</sub> ; flush and/or replace the UF membrane; disinfect Tap, Flow Gauze and Pressure Vessel
Manometer is not working	Check the supply hose to the manometer for leakage; Manometer could be affected by temperatures minus 0 Celsius
No or low water coming out of the tap, heavy pumping.	Check all hoses, fittings and connections for leakage; be aware that the connections of the inlet hose to the Villagepump and to the mesh filter are completely air-tight. Also the filter housing for the AC cartridge and the washable membrane should be air-tight. You may have to lubricate the 0-rings with the provided Silicon Compound.
	Make sure the Mesh Filter is completely in the water
	Check that the Mesh Filter is clean or clean it.
	Remove the Valve; if the pumping is not heavy anymore, that probably the UF membrane has been clogged. In that case clean or replace the UF membrane
	Vertical distance between Villagepump and water surface is more than 3 meters.
System is not working properly, air bubbles are in the water that comes out of the tap.	Air can be locked-up in the system. Backwashing usually takes care for removing air. But also unlocking the Screw Cap – during pumping - of the Valve/Dispenser helps to release air.
When backwashing, water is coming out of the tap	Air has been locked in the system. Pump till a next backwash cycle has been performed or unscrew the black Screw Cap of the Valve.
A lot of water is coming out of the drain hose	The drain valve in the valve has been disturbed. By dismounting the plunger and put it back (par 5.2), usually this problem is solved.
Back-wash is not working, pressure is 4 bar or more.	The plunger is stuck in the valve (par 5.2) or sand particles are blocking the system. Clean the system (par 6.9)
The Pump Handle makes noise (wheezing)	Greasing the bearings of the Pump Handle;.
Leakage at the Feed Pump	Dismantle the red cylinder of the Feed Pump, unscrew the grey cap and put silicon compound on the seal in the grey cap; mount everything back in the same way (in version 7 or higher, the grey cap has been glued and leakage can't occur at all).

## 9 Protocol water analysis

For the analysis of the water quality, please follow the protocol below.

The protocol covers two cases:

1. Preliminary analysis before deploying the Villagepump in order to establish a suitable water source;
2. Regular analysis of the RAW and TREATED water after deployment.

In all circumstances use sterile sample bottles, preferably supplied by the laboratory conducting the tests.

### 9.1 Preliminary analysis

Test the raw water for:

1. Toxic substances like Arsenic (As), Mercury (Hg) and Fluoride (F)
2. Pesticides, like Organophosphates, Carbonates and Organochlorides.
3. Non-oxidized (heavy) metals like: Cadmium (Cd), Calcium (Ca), Chromium (Cr), Copper (Cu), Iron (Fe), Lead (Pb), Magnesium (Mg), Nickel (Ni) Sodium (Na) and Zinc (Zn).
4. Nitrates (NO<sub>2</sub>, NO<sub>3</sub>)

The resulting levels should be compared to WHO standards. If the levels measured are above WHO (or national) standards, please contact Villagepump BV. Possibly we can advise you on acceptable solutions available.

### 9.2 Regular Analysis

Given a positive preliminary analysis, the focus in this case will be on bacteriologic fouling (Total Coliform and E.coli or F. coli). Total Coliform is a group of bacteria present all around us, most of which are not dangerous to human health. However, these bacteria are not naturally present in groundwater and are an indication that more harmful organisms might be present (E.coli and F.coli). The latter two forms of bacteria pose an immediate risk to human health.

In order to be able to perform a consistent test, the following procedure should be followed.

1. Disinfect the system by following the procedure described at par. 7.2.
2. Pump at least two backwash cycles are completed.
3. Remove the flow gauze from the tap and sterilise the tap (flaming).

Procedure: remove the plastic flow gauze with the special flow gauze key, part of the tool set. Heat the stainless steel tap with a butane or propane burner until it is hot. If you stroke the pump handle a little bit of steam should be visible.



*Removing flow gauze, disinfect tap and flaming the tap*

4. Take a sample IMMEDIATELY after flaming the tap, using the sterile sample bottle provided by the laboratory and close the bottle.
5. Take a sample from the RAW water (directly from the water source).

Note: If required test the possible fouling of the AC cartridge by taking water samples with or without the AC cartridge mounted

6. Mark the sample bottle from the water source with 'RAW-Water' and the clean sample with 'TAP-water' (TAP + AC if the AC cartridge is to be tested). Make a note of the date, time and place of the samples.
7. Transport the samples in a cooled environment (e.g. cool box filled with ice). The samples should have a temperature of 5° C (+/- 3°).
8. Have the samples analysed within 24 hours by an accredited laboratory.

## 10 Datasheet Villagepump

<b>Dimensions Villagepump Including packaging</b>	1,73m x 0,50m x 0,62m (h x w x d); 1,76 m x 0,53 m x 0,75 m (l x w x h);
<b>Weight</b>	Villagepump complete: app. 80kg – with AC 88kg Incl. packaging: app. 99kg - with AC 107 kg
<b>Performance<sup>1</sup></b>	Max 8 l/min
<b>Installation connections (inlet, drain)</b>	Reinforced Hose, diameter ¾"; Maximum static head: 3 meter; Maximum distance to water: 10 meter
<b>Technology</b>	0,05 mm mesh filter Capillary Ultrafiltration membrane Activated carbon block (optional)
<b>Cleaning</b>	Automatic high-pressure backwash Periodical chlorine dispensing
<b>Biological retention</b>	Total Coli and/or E Coli/F Coli: < 1 CFU/100ml Total Plate Count: <100 CFU/1ml Turbidity: < 5 NTU (maximum 100 NTU in raw water)
<b>Membrane approvals/compliances</b>	NSF 61
<b>Storage and handling</b>	Villagepump should be stored dry and protected against freezing. After first use Villagepump should be operated at regular times (preferable at daily base). When stored for a longer time, special treatment is needed.
<b>Operating conditions</b>	Ambient temperature min +1°C, max +40°C Feed water temperature min +3° C, max +35°C
<b>Activated Carbon cartridge</b>	20" x 2,5" Carbon Block, minimal flow 450 L/h

### Villagepump BV

Amsterdam, The Netherlands

[www.villagepump.org](http://www.villagepump.org)

For any question or remark, please contact your local distributor or Villagepump via [info@villagepump](mailto:info@villagepump).