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U.S Patent 11,274,048 B2

PortaWell Operations Guide

Rev 15

Water filtration system for family emergency preparedness

Congratulations on your purchase of the PortaWell™ portable water filtration system. This patented system is made in the USA and is designed to provide an affordable and efficient method for filtering potentially harmful contaminants (both biological and chemical) from a non-potable water source in an emergency or off-grid camping situation to make it suitable for human consumption.

A. Introduction

PortaWell is shipped with three general purpose filters: Sediment for reduction of particulate such as silt and sand, Ceramic for reduction of biologics such as bacteria and cysts (i.e., giardia) and Activated Carbon Block for reduction of chlorine and volatile organic chemicals (i.e., herbicides and pesticides).

The PortaWell design provides the following:

1. It is compact and portable (weighs less than 10 lbs.)
2. It is designed to fit in a standard 5-gallon dual purpose bucket for ease of storage or transport.
3. It uses standard commercially available 10-inch filters (filters can be tailored to specific contaminant needing removal).
4. It provides two-stage filtration for effective reduction of most common water borne contaminants.
5. A small 12-volt battery (optional) that is rated a minimum of 7 to 10 Amp hour can be used to power the PortaWell. A 30-to-50-watt solar panel (optional) can be used to recharge the battery or extend the battery pumping time.
6. It effortlessly provides up to 1 gallon per minute flow rate allowing a larger volume of water to be processed than alternative gravity fed or mechanically pumped systems.

B **Precautions**

1. Use good judgement when selecting a water source to be filtered and always seek the best fresh water source available. Avoid water sources that are obviously contaminated with chemicals, heavy sediment, algae bloom, and/or biological waste (animal or human) products. If viral contamination of the water is suspected, consider post treatment with a chlorine solution and let sit for 30 minutes before drinking.
2. The pump is not designed for continuous duty operation. To extend the life of the pump, best practice is to operate for up to 30 minutes and rest for 5 minutes. If the ambient temperature is above 90 degrees F, reduce the operating time and extend the rest times accordingly. Always shield the pump from direct sunlight when operating to help minimize pump overheating.
3. Do not store the PortaWell in below freezing conditions unless the system has been winterized to remove all water from the filter housings, transfer tubes and pump.
4. Do not store the PortaWell in direct sunlight. This is to prevent deterioration of the filter housing.
5. Do not pump anything other than water through the PortaWell.
6. Do not power the PortaWell with any source other than 12 volts. Solar panel (if used) should be connected to a battery and battery to the PortaWell. A 110 volt to 12-volt transformer (optional) may be used to power the PortaWell.

7. Do not operate the pump without the screen inlet filter. This is to prevent debris from entering the pump.
8. Do not store the PortaWell with water in the filter housings for more than 72 hours. This is to prevent any algae buildup.
9. **Do not use with a damaged or cracked filter cartridge. Use care in handling the ceramic filter as it is fragile and easily broken.**

C. Setup –Filter Install

The PortaWell is compatible with standard 2 ½ inch by 10-inch filters that can be configured to reduce sediment and particulate (sediment prefilter), pathogenic bacteria and cysts (ceramic filter), and organic chemicals and chlorine (carbon block filter). Other specialty filters may also be installed to remove other contaminants (i.e., heavy metals, tannins, fluoride) that may be present.

1. Wash hands before handling filters.
2. Installation of OBE (Open Both Ends) filters
    a. Remove filter housing by unscrewing the transparent cannister bowl from the top and remove from the PortaWell. Take care to not lose or damage the bowl O-ring.
    b. Remove the filter from the packaging and place (with washers) into the bowl and over the bottom sealing protrusion. Orientation of the OBE filter does not matter as there is no top or bottom. The Doulton Ceramic filter (if supplied) must be installed with the open end at the top.
    c. Reinstall the bowl to the housing top. Move the bowl around until the top of the filter engages the top protrusion making sure the sealing washer is still intact. (*If bowl will screw into the housing top, the filter is securely installed)*
    d. Hand tighten the bowl to the housing. A small amount of plumber's silicon grease on o rings and gaskets ensures a secure fit.

Operation

1. Remove PortaWell from the 5-gallon bucket and place on a stable level surface.
2. Attach the clear plastic inlet tubing to the inlet barb of the pump. Tubing is attached by pressing the tubing onto the barb. The inlet tubing has the screen filter on one end. A clamp is not necessary because this is a low-pressure fitting.
3. Attach the clear plastic outlet tubing to the outlet barb of the filter housing. Tubing is attached by pressing the tubing onto the barb. A clamp is not necessary because this is a low-pressure fitting. *Note: Use caution to keep the outlet tubing clean and free of any contamination as this is used to transfer the clean, filtered water to the potable water storage container. Do not interchange the inlet and outlet tubing.*
4. Place the end of the outlet tubing into a clean container. Best practice is to use a food grade rated container that has a lid to store and transport the filtered water.
5. Place the end of the inlet tube (end with the small screen filter) into the non-potable water source. Best practice is to bucket the water from the source (stream, river, lake, pond etc.,) and then pump from the bucket.
6. Connect the power pigtail to the pump.
7. When ready to begin pumping, affix the alligator clamps to the battery taking care to connect red clamp to the positive battery terminal and black clamp to the negative battery terminal and switch the PortaWell to the on position.

Note: Maximum operating pressure of the pump is 45 PSI. If pump fails to run continuously when switched to on, it is usually because the ceramic filter has been plugged and needs to be cleaned before proceeding.

Note: Choose the source water carefully. Source water that contains large quantities of particulate such as sediment, silt or especially algae can cause premature clogging of the ceramic filter pores and ultimately will reduce the useful life of the filter. The ceramic filter is designed to efficiently remove submicron contaminants but if the source water also contains visible particulate, these larger particles may load up the ceramic filter to where the pump stops, and the ceramic filter requires cleaning.

E. Storage

When the PortaWell will not be operated for more than 72 hours, it is important to remove the water from the filter housings and filters to prevent possible algae growth.

1. Run the pump to expel as much water as possible from the housing. (Pump can be run dry with no damage)
2. Remove the housings and the filters from the PortaWell.
3. Empty the filter housings of any residual water. Take care to not let any unfiltered water in the housing come in contact with the inside (clean side) of the filter.
4. Shake any residual water from the water filters.
5. Air dry the housings and filters for 24 hours or until all residual water is evaporated.
6. Remove the tubing between the outlet of the pump and the inlet filter housing to drain any excess water.
7. Reinstall filters and housings.

Note: Care must be taken when removing the ceramic filter for storage that the inside of the filter (clean side) does not become cross contaminated with water from the outside (unfiltered side). Best practice is to rinse the housings and ceramic filter in a 1% chlorine bleach solution for 10 minutes before air drying and storage. 2 tablespoons ***bleach*** *per 1-quart* ***water*** *will give a 1000+ ppm* ***disinfecting*** *solution.*

G. Limited Warranty

Your PortaWell is warranted to be free from defects in materials and workmanship for 1 year from the date of purchase.

In the event of a defect in material or workmanship within the 1-year warranty period, PortaWell will either repair, replace or refund the purchase price of your PortaWell at PortaWell's discretion.

The warranty does not cover any damage caused by product misuse, abuse, or failure to follow instructions. The warranty does not cover damage to, breakage or fouling of filters.

For Service Contact: Customer Service Tel. 435-527-5272 or support@myportawell.com

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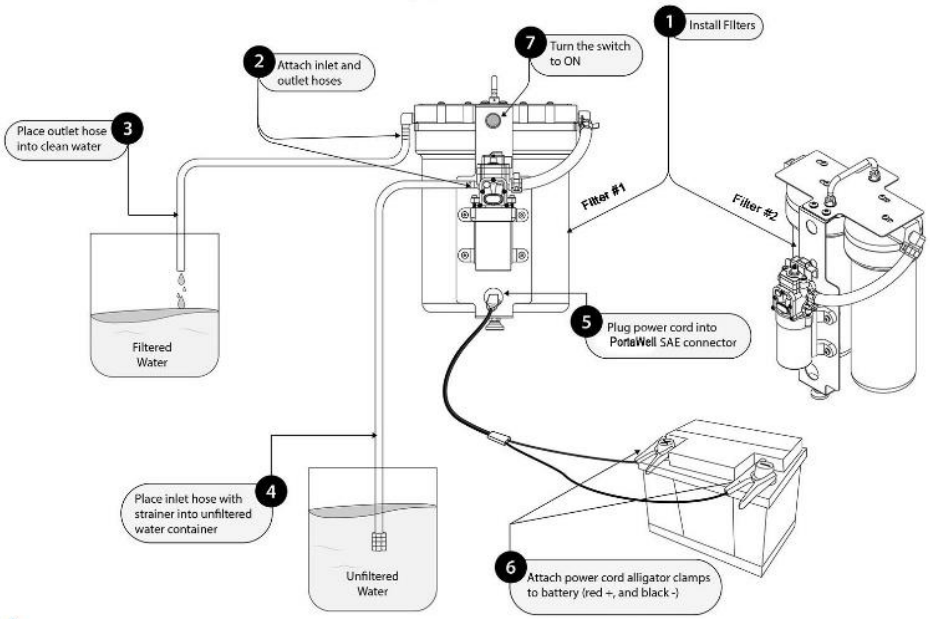
PortaWell Quick Start Guide



PortaWell™

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PortaWell supplied filter characteristics

1. **Sediment Filter** Melt blown spun polypropylene
    a. Operating Temperature ----------40 to 180 degrees F
    b. Pore Size----1 micron
    c. Replacement------1000 gallons or upon filter noticeable flow restriction
    d. Contaminant removal------silt, sand, organic debris

2. **Ceramic Filter** Meets NSF Standards 42 and 53 Silver impregnated to prevent bacteria growth
    a. Maximum Working pressure……..125 psig
    b. Maxim working temperature……..100 degrees F
    c. Recommended flow rate…… .3 to 1 gpm
    d. Recommended cleaning frequency……. when flow is noticeably lower
    e. Contaminant removal
        i. Pathogenic bacteria: Cholera, Typhoid, Salmonella, Serratia, Fecal Coliform >99.99% E coli – 100%
        ii. Cysts: Cryptosporidium Parvum, giardia Lamblia – 100%
        iii. Sediment: Down to .8 micron – 100% .3 to .8 micron >99.99% Turbidity > 99.97%
        iv. Metals: Iron, Aluminum

3. **Carbon block** 5-micron Coconut Shell Carbon block
    a. Maximum Working pressure…….80 psi
    b. Maximum Operating temperature……100 degrees F
    c. Flow rate……..1 gpm
    d. Replacement…….1500 gallons
    e. Contaminants
        i. Reduces Chlorine, Insecticides, Benzene, Tastes, Odors and other Organic Chemicals

Selection of Filter and Filter sequence

Note: This table is for information only and it is the responsibility of the user to select the appropriate water source and filter setup as some water sources may have additional contaminants than shown below.

Contaminant Categories

1. Biologic
    - Bacteria, Cysts (>.5 to 1-micron diameter)
    - Virus (< .5-micron diameter)
2. Organic Chemical
    - Pesticides
    - Total Organic Carbon, Industrial Solvents,
    - Aromatic compounds
    - Algae color and cyanobacteria toxins
3. Organic plant
    - Algae, Moss, plant/animal decay
4. Inorganic Chemicals
    - Chlorine
5. Sediment
    - Dirt, silt, sand

Treatment Purpose/Filter sequence

1. Chlorination Treatment (used to kill when high levels of pathogenic bacteria and virus are present)
2. Sediment Filter (Used to remove particulate >1 microns)
3. Ceramic Filter (Used to remove .5 to 1-micron biologic contaminants including giardia, crypto and bacteria)
4. Carbon Block Filter (Used to reduce volatile organic chemicals, toxins, and chlorine)

Note: The filters listed above do not remove inorganic dissolved solids such as magnesium and calcium (hard water). They also do not remove salt from seawater or saltwater pools.

Water contamination filter selection guide[1]

Water Source	Water Quality	Contaminant Categories	Filter/Treatment Sequence
Pond	Cloudy	1,2,3,5	2,3 and 1 and 3,4
Mountain Stream	Clear	1,5	2,3
River, Canal	Cloudy	1,2,3,5	2,3 and 1 and 3,4
Lake	Clear	1, 5	2,3
Runoff Retention Pond	Clear	1,2	2,3 and 3,4
Rainwater Collection	Clear	1,5	2,3
Spring	Clear	?	2,3
Swimming Pool	Clear	1,4	3,4

[1] *In cases where water source is heavily laden with multiple contaminants, it may be necessary to filter the water twice, changing filter types between treatments based on the table above.*

Note: Best practice is to always place the carbon block filter after the ceramic filter. This prevents the carbon filter from becoming potentially contaminated and prevents premature fouling of the ceramic filter due to shedding of small carbon particles during the initial phase of filtration.

Trouble Shooting Guide

Problem	**Potential Cause**	**Fix**	**Comments**
Water leaking from filter housing	O-ring damaged or missing	Replace housing O-ring	Note: Apply a small amount of plumber's silicone grease to O-ring and groove to improve sealing of cannister to top.
	O-ring/housing groove dirty	Clean O-ring and can	Clean O-ring and O-ring groove of any particulate; apply plumbers' grease to O-ring and groove and hand tighten.
	Filter housing too loose	Hand tighten canister	Note: Cannister should be hand tightened only to snug fit
	Filter housing too tight	Loosen canister, inspect O-ring and replace if damaged.	Retighten to snug fit
Pump running but not pumping	Polarity reversed	Make sure red power lead is connected to positive (+) terminal and black lead is connected to negative (-) terminal of battery	Note: On a DC pump motor, reversed polarity will cause the pump to run backward
Pump starts but stops after the filter housings are full	Filter(s) is plugged	Clean Ceramic filter Replace Sediment Filter	Note: Pump will automatically shut off if discharge pressure is above 45 PSI. This is usually due to the ceramic filter becoming plugged with fine particulate or algae that has passed through the sediment filter.
Cracked or Damaged filter	Dropped or crushed filter	Replace filter	Note: Inspect filters before use for any cracks or tears. A damaged filter is unsafe as it will allow contaminants to pass unfiltered through the PortaWell.
Water has a slight coloration after being filtered	There are soluble contaminants in the water. This is usually caused by algae contamination of the water.	Use the Carbon Block filter to reduce algae coloration.	Note: Some organic and inorganic contaminants can only be removed with special filters.