

PedalPure™

The Portable Ultra-Filtration Water Treatment System

In many disasters, contaminated water remains a critical issue. The portable ultra-filtration PedalPure system would allow more victims access to clean and safe water for consumption and survival.

The pedal-powered filters do not require electricity to pump, and as such are very appropriate for use in disaster-stricken and remote areas where power supply is affected or scarce.

The 700-litre-per-hour system was designed in partnership with the Singapore Polytechnic. Each unit is able to fill 466 bottles (1.5 litre capacity) with water per hour. Equipped with wheels and brakes, the system is easily transportable across challenging terrains.

Pedaling activates the piston pump, which begins passing water through a dual-flow fibre membrane system. This process is known as ultra filtration which removes particles larger than 0.01 microns, including most bacteria.

When the membranes are dirty, a pressure gauge will show an increase in pressure, indicating that the system requires cleaning. The membranes can be easily cleaned through a backwash. During backwashing, clean water flows in a reverse direction through the membranes to remove the sediments and micro-organisms stuck on the membrane surface. Thereafter, the membranes will be ready to produce more water.



Photo courtesy of Mercy Relief

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Technical Specifications

Length	102cm
Width	72cm
Height	130cm
Weight (dry)	38kgs

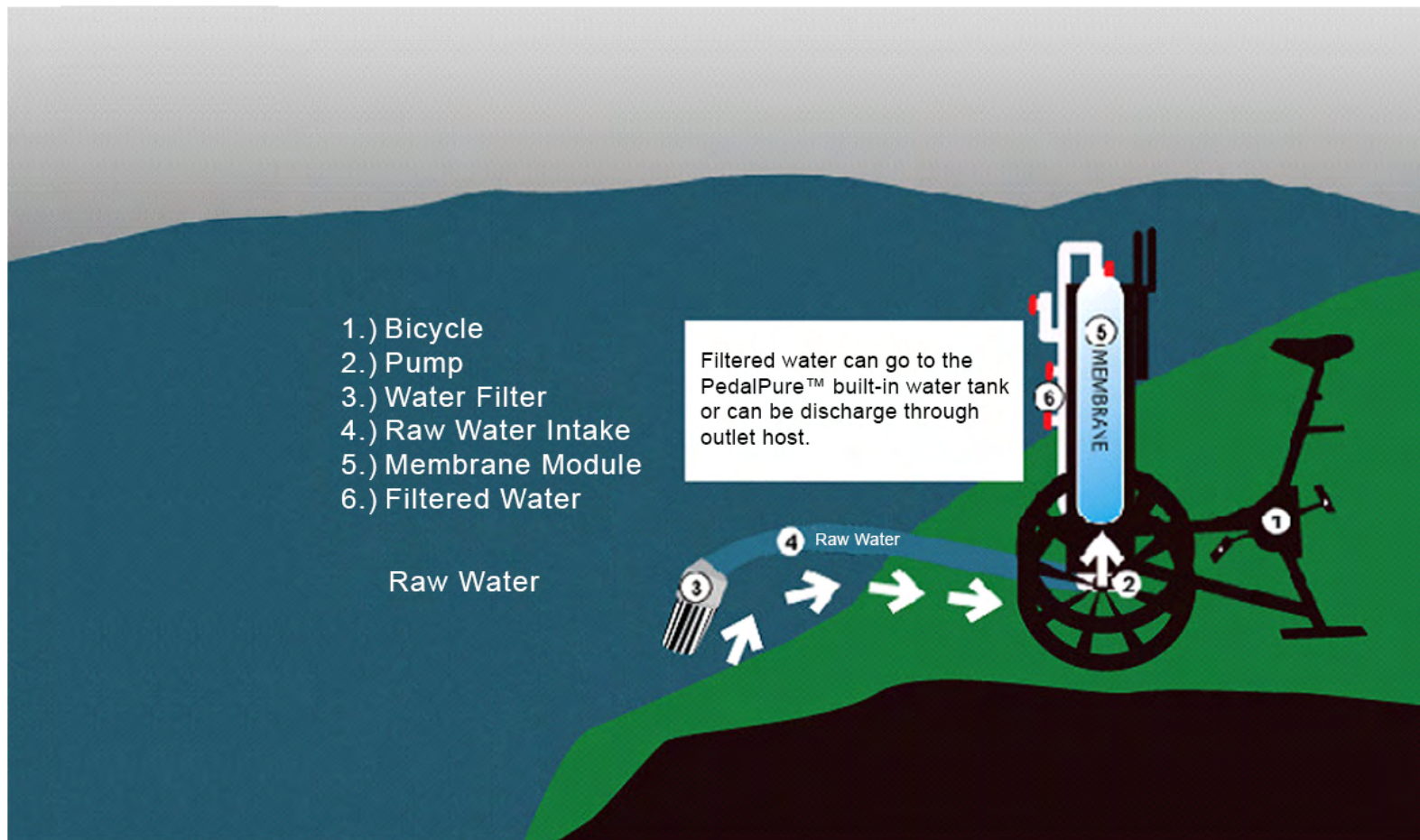
Membrane Specifications

Casing type	90*800 / Side Port / UPVC
Casing length,	800mm
Casing diameter,	90mm
Total weight, kg	5Kg
In / Outlet port size,	32mm
Filtered water quality	Turbidity ≤ 0.1 NTU
Micron rating	0.01 micron
MWCO	80000 Dalton
Filter area,	2.6m ²
Nominal Flow-rate	700 liter/hr (2 Membranes)
PH range	2 ~ 12

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Water flow illustration



Advantages of PedalPure™ system include:

- Compact, lightweight and transportable, reducing logistics cost for deployment
- Able to meet aircraft maximum dimensions for airfreight
- 100% Manual powered, works with no power supply
- High flow rate (up to 700L/h for relatively clean water)
- Membranes tested at third party lab
- Meets WHO recommendations for drinking water
- Easy to operate and maintain
- Wheels do not require inflation and are puncture proof
- No refitting of pipes required for back flushing (Simple to use)
- Adjustable seat fits persons of most ages
- Wheels allow easy relocation after deployment
- Long product life if properly maintained

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Steps to operate

- 1) Push the **PedalPure™** system near to water source.
- 2) If positioned on a slope, apply the brakes on both wheels of the system)
- 3) Place the intake hose inlet into the water source
- 4) Adjust the seat to suitable height. Your legs should be almost fully extended at a full pedal as an optimal height
- 5) Configure the taps as per Illustration on left
- 6) Pedal on the unit normally. The water should start to go through the intake hose.
- 7) Keep pedaling until the water starts to discharge from the outlet hose or into the inbuilt water tank depending on the route of discharge.



Illustration1: Brakes to prevent the wheels from rolling



Illustration 2: Intake hose. Submerge the intake hose head into water source.



Illustration 3: Adjustable seat.

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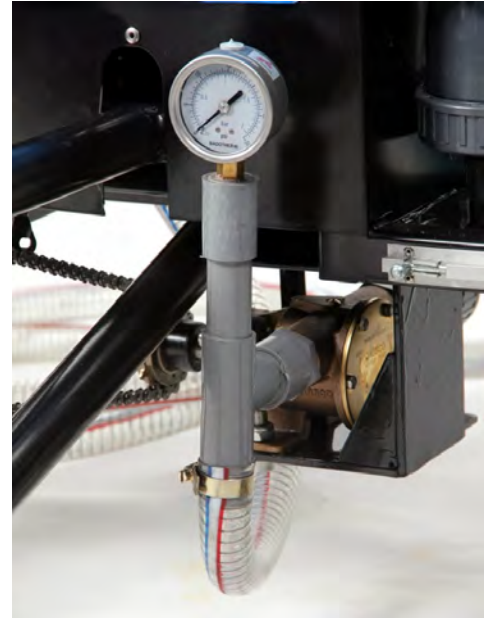
Maintenance / Back flushing

It is recommended to back flush the membranes daily to flush out clogged pores of the membrane fibers. This extends the product life and also ensures the quality of water filtered by the membranes.

Always ensure pressure does not exceed 0.1Mpa during use on the pressure gauge!

Signs of clogged pores / pipes include:

- Little water filtered despite pedaling hard
- Difficulty in pedaling
- High reading on pressure gauge



Steps to back flush the system

- 1) Configure the hose taps as per illustration on right
- 2) Close the tap to the water tank
- 3) Submerge intake hose into **clean** water source
- 4) Pedal normally. The sediments should start to flush out from the 2 bottom taps indicated by red arrows on right.
- 5) Continue to pedal. When the membranes are clean, the flushed contents will show relatively clean water.



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Chemical cleaning

A periodic Chemical Flushing is also needed in order to remove organic & inorganic matters that could foul up the UF. For heavy usage, we recommend every 5- 7 days flushing for 20 min. Chemical to be used for respective purpose as below.

- * Inorganic Scalant (Fe, Mg, Al, Ca) - Citric Acid , 3~5%
- * Organic matters - NaOH, 3~5%
- * For sanitization of UF - H2O2, 3~5%

Other information

<i>Recommended Maintenance & Cleaning Parameters*</i>			
Forward-flushing	Duration		20~60s
	Frequency	Low turbidity water	60~120 min.
		High turbidity water	10~30 min.
		Wastewater	5~20 min.
	Pressure		0.1-0.2MPa
Backward-flushing	Duration		20~60s
	Frequency	Low turbidity water	120~240 min.
		High turbidity water	10~30 min.
		Wastewater	5~20 min.
	Pressure		0.1-0.15MPa
Chemical cleaning flushing	Method		Circulation Flushing
	Duration		30-120 min.
	Frequency		1~3 days
	Pressure		0.1MPa
	Chemical & dosage	Scalant (Fe, Mg, Al, Ca)	Citric Acid
		COD, BOD, organic matter	NaOH
		For disinfection	NaClO

<i>UF Membrane Capillary Details</i>	
Capillary raw material	PAN
Capillary qty.	Appx. 1200
Capillary bore diameter	1.00mm
Capillary outer diameter	1.66mm
Capillary thickness	0.33mm
Capillary lengthways strength	13kg/cm ²
Capillary cracked strength	11MPa
<i>Recommended Operation Parameters*</i>	
Recommended operation pressure	100 ~ 300kPa
Maximum feed pressure	350kPa
Maximum Feed water turbidity	50 NTU
Temperature range	5-45°C
Maximum Total Suspended Solids/ particle size	50mg/l & 10mm
Tolerance of continuous chlorine dosage, mg/l	50ppm
Tolerance of batch chlorine dosage, mg/l in min.	200ppm for 30 min.

* Guide lines for reference purposes only. Pilot testing should be performed to ascertain the suitable maintenance parameters as feed water quality is subject to case-to-case basis.

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***** Disclaimers *****

-PedalPure™ water filtration system is not intended for muddy water or high turbidity water.

-Using **PedalPure™** on muddy water will clog the membranes.

-Recommend raw water intake source from flooding, ponds with low or medium turbidity.

-Membranes do not filter chemicals which are dissolved into water.

- It is the responsibility of the user to clean the system regularly to ensure reliability of filtered water, as well as the life of the system.

- The cleaning instructions offered are guidelines. As the water turbidity and quality differs from situations, it is not possible to indicate a fixed set of cleaning instructions.

- Do not expose the membranes under strong sun for prolonged periods.

- Do not operate the system if you are not feeling well or are not in fit condition to exercise.

-Stop pedaling if you feel unwell during pedaling.