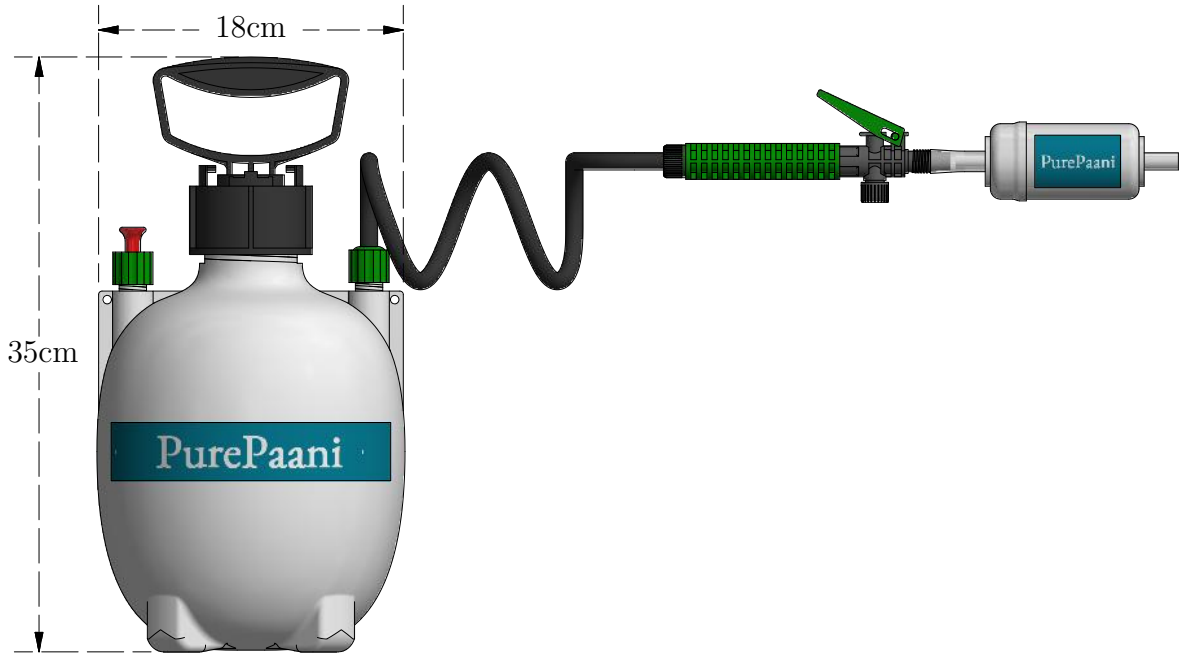
# Hand-Powered Water Filter

## Detail and Assembly




## Version 6.00

Patent Pending

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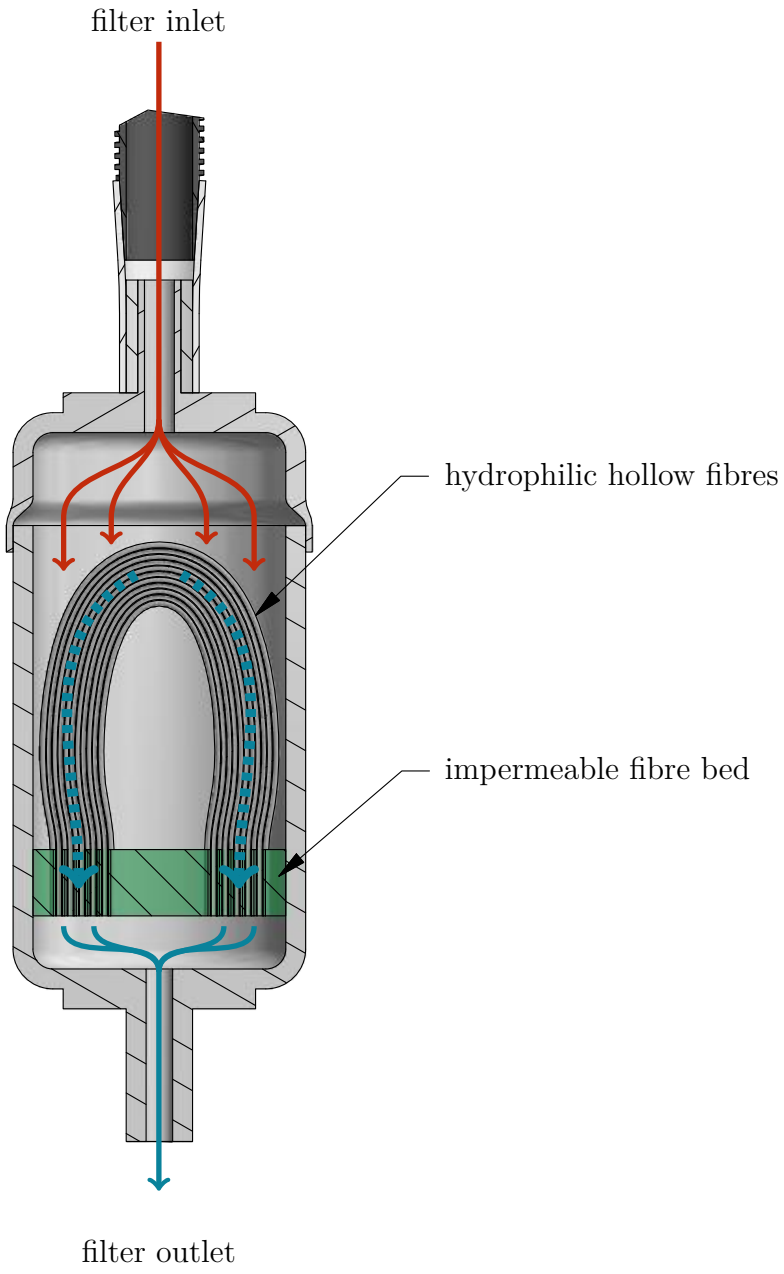
# Contents

# 1) Introductory Details

## 1.1) Ultrafilter Detail




**a.)** Raw, influent water enters at the filter inlet.

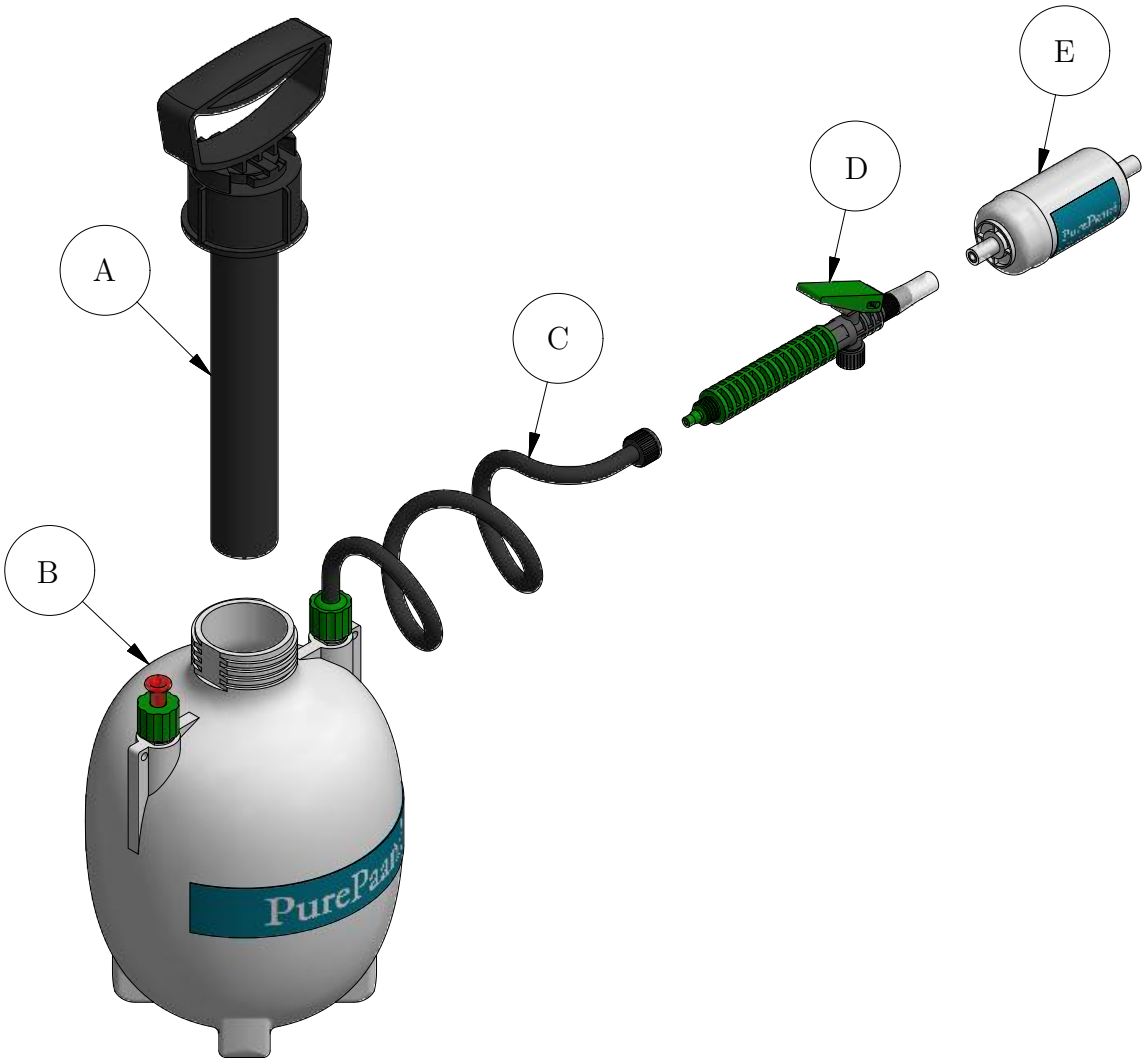
**b.)** The inletoutet pressure gradient drives water into the the hydrophilic hollow fibres.

**c.)** Many pathogens in the influent water cannot pass through the fibre's small pores.

**d.)** Water with reduced pathogens passes through the fibres, to the filter outlet.

**e.)** The filter produces effluent with reduces pathogens at its outlet.

## 1.2) Parts List

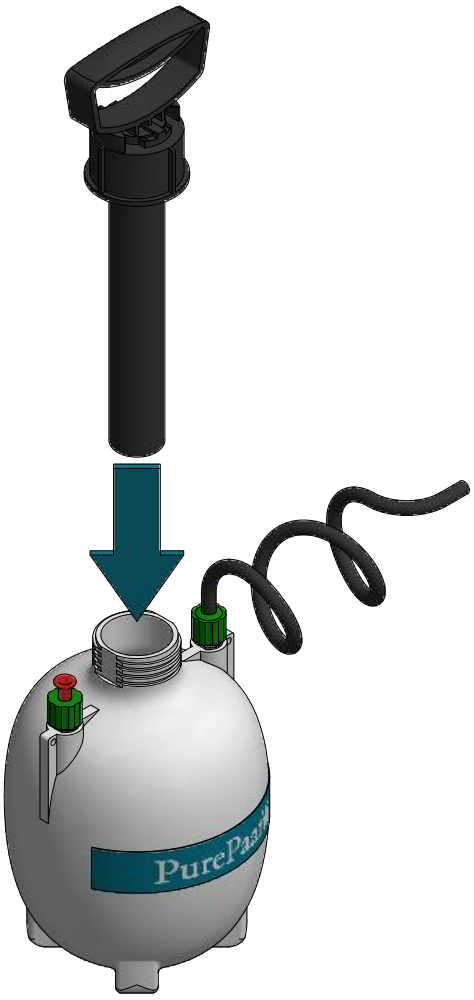


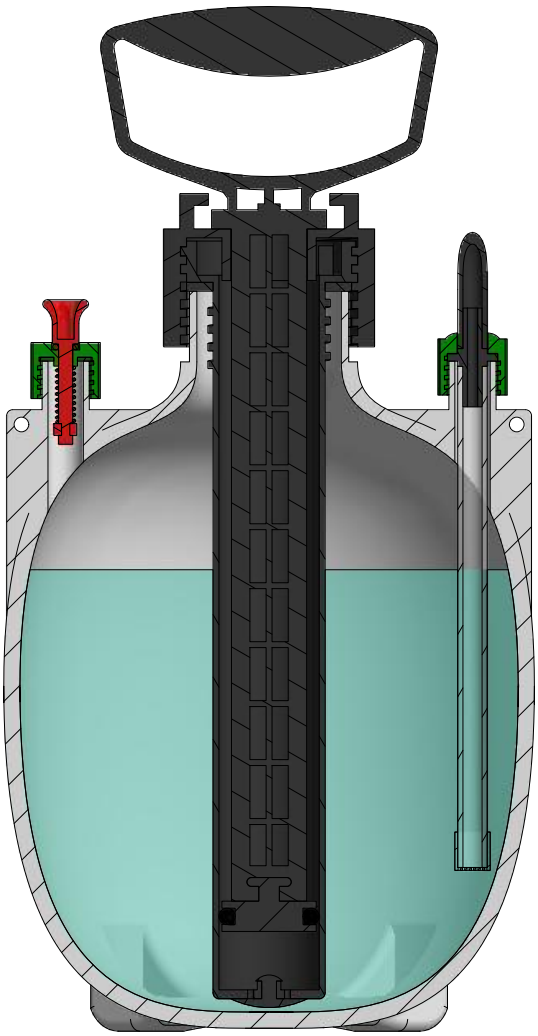

| No. | Description |
|---|---|
| A | Pumping Wand |
| B | Container |
| C | Effluent Hose |
| D | Trigger Wand |
| E | Ultrafilter |

# 2) Operation Steps

## 2.1) Operation Step A - Container Loading

The operator fills the container with water and inserts the pumping wand.

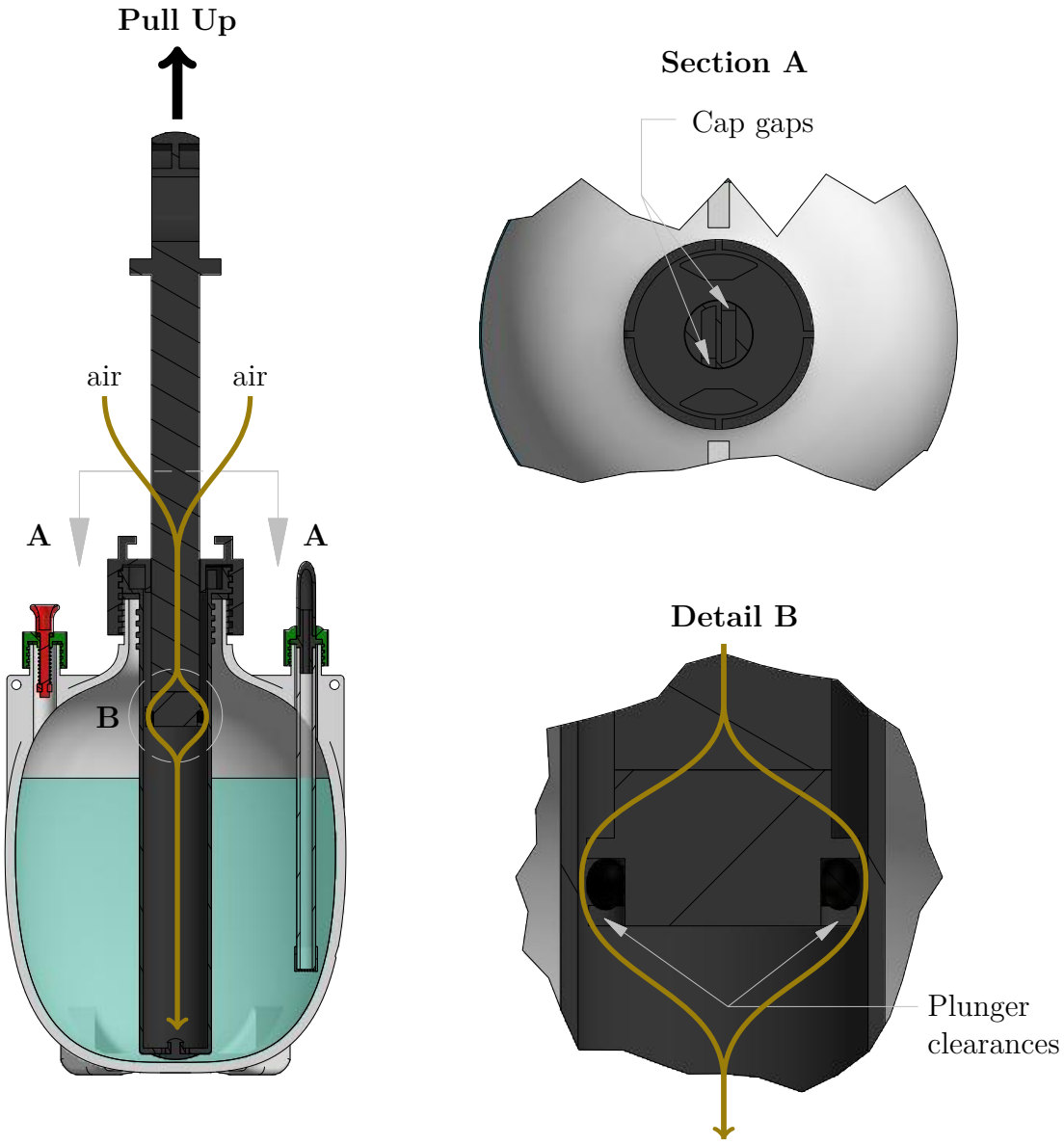




## 2.2) Operation Step B - Trigger Wand Attachment

The operator attaches the trigger wand to effluent hose.

## 2.3) Operation Step C - Up Stroke



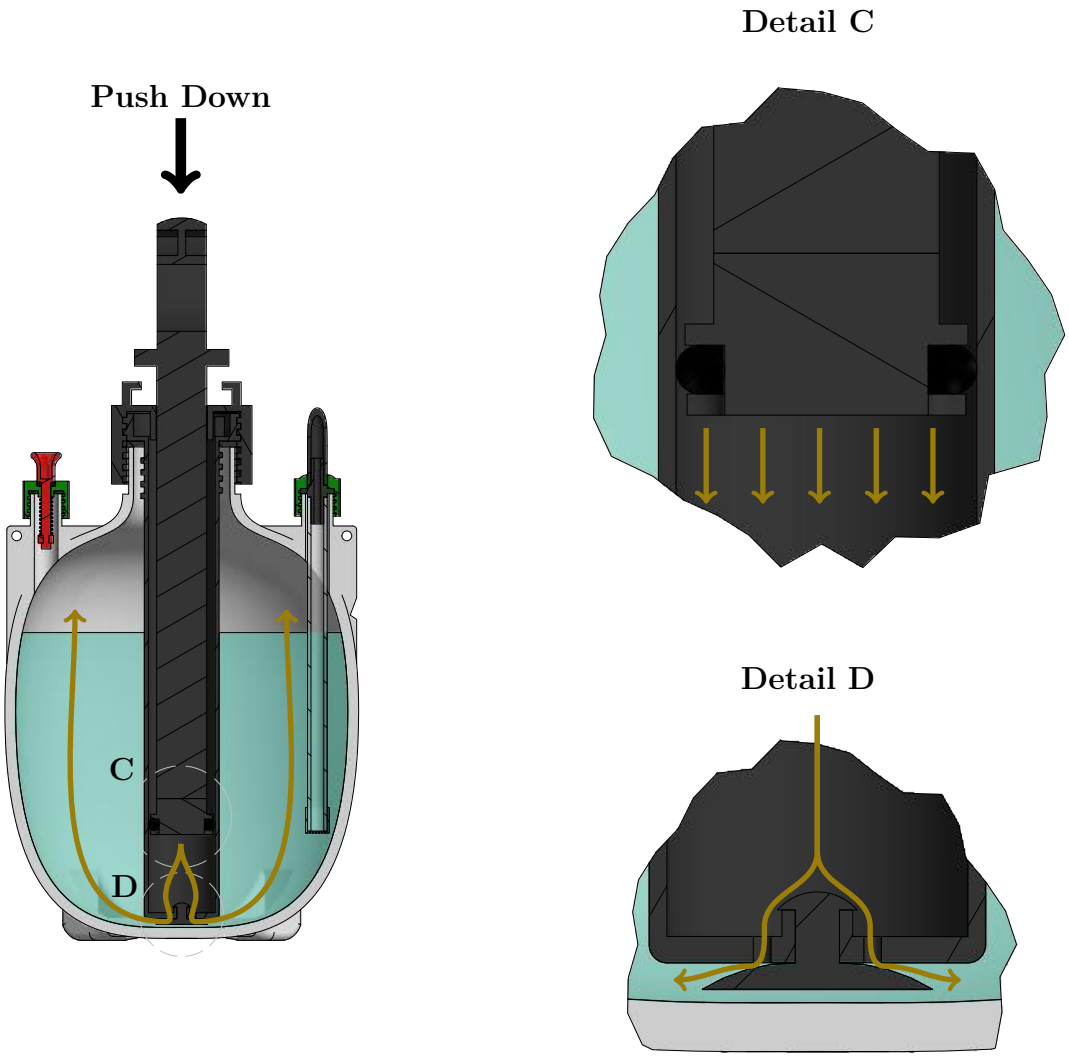

**a.)** The operator pulls up on the handle wand, creating a vacuum in the lower part of the pump chamber.

**b.)** As shown in Section A, this vacuum draws air into the upper part of the pump chamber through gaps on the top cap.

**c.)** As shown in Detail B, the o-ring on the plunger compresses horizontally and expands downwards into a small pair of clearances built into the plunger.

**d.)** The air passes through the gap created by the compressed o-ring and collects into the lower part of the pump chamber, reducing the induced vacuum.

## 2.4) Operation Step D - Down Stroke



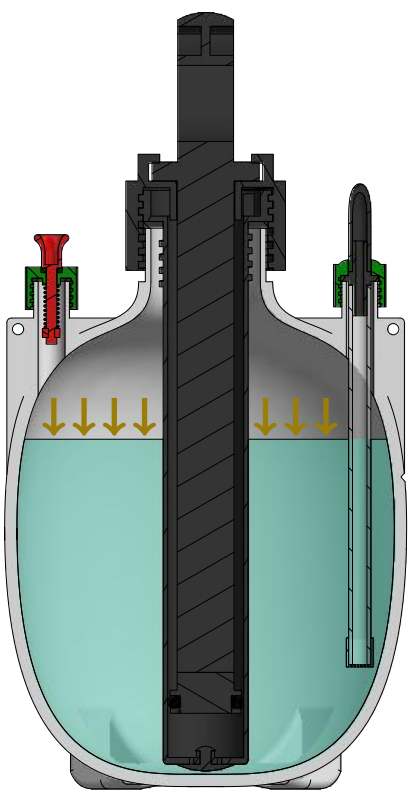

**a.)** The operator pushes down on the handle wand.

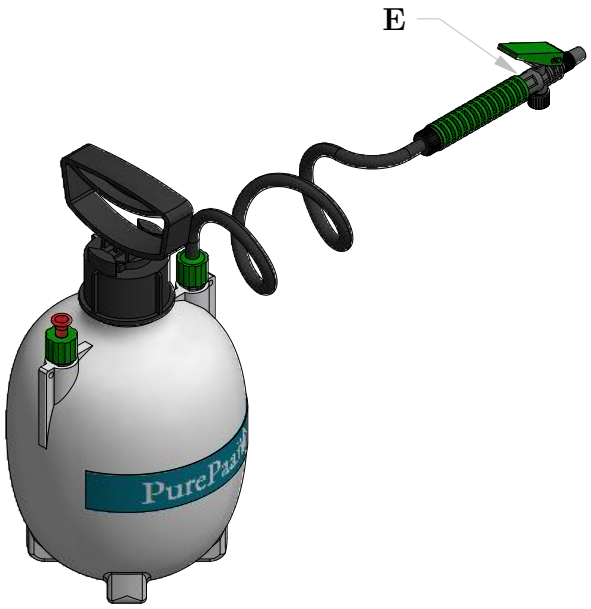
**b.)** As shown in Detail C, the o-ring on the plunger forms a tight seal against the upper lip as there are no clearances to expand upwards. This creates a positive pressure in the region of the pump chamber below the plunger.

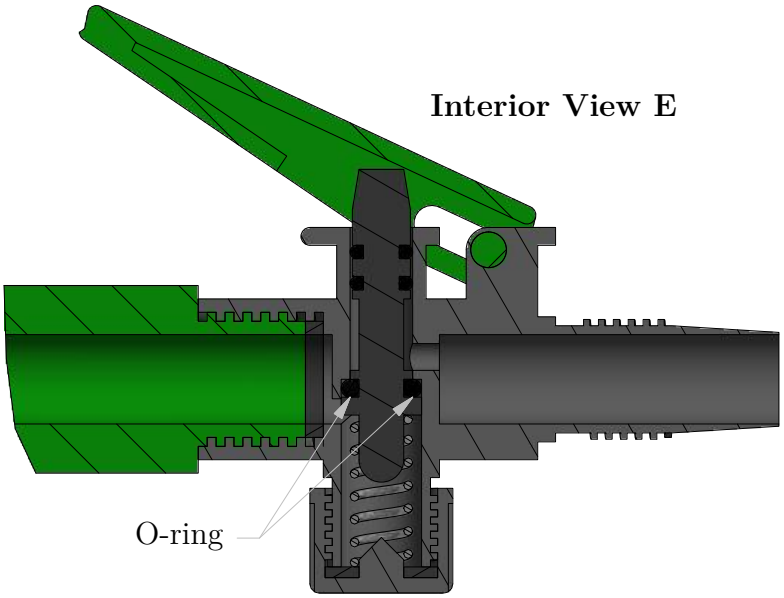
**c.)** As shown in Detail D, this positive pressure causes a non-reversible rubber seal at the bottom of the pump chamber to deflect downwards, allowing air to escape into the interior water.

**d.)** The air then rises to the upper portion of the container.

## 2.5) Operation Step E - Storage of Positive Pressure



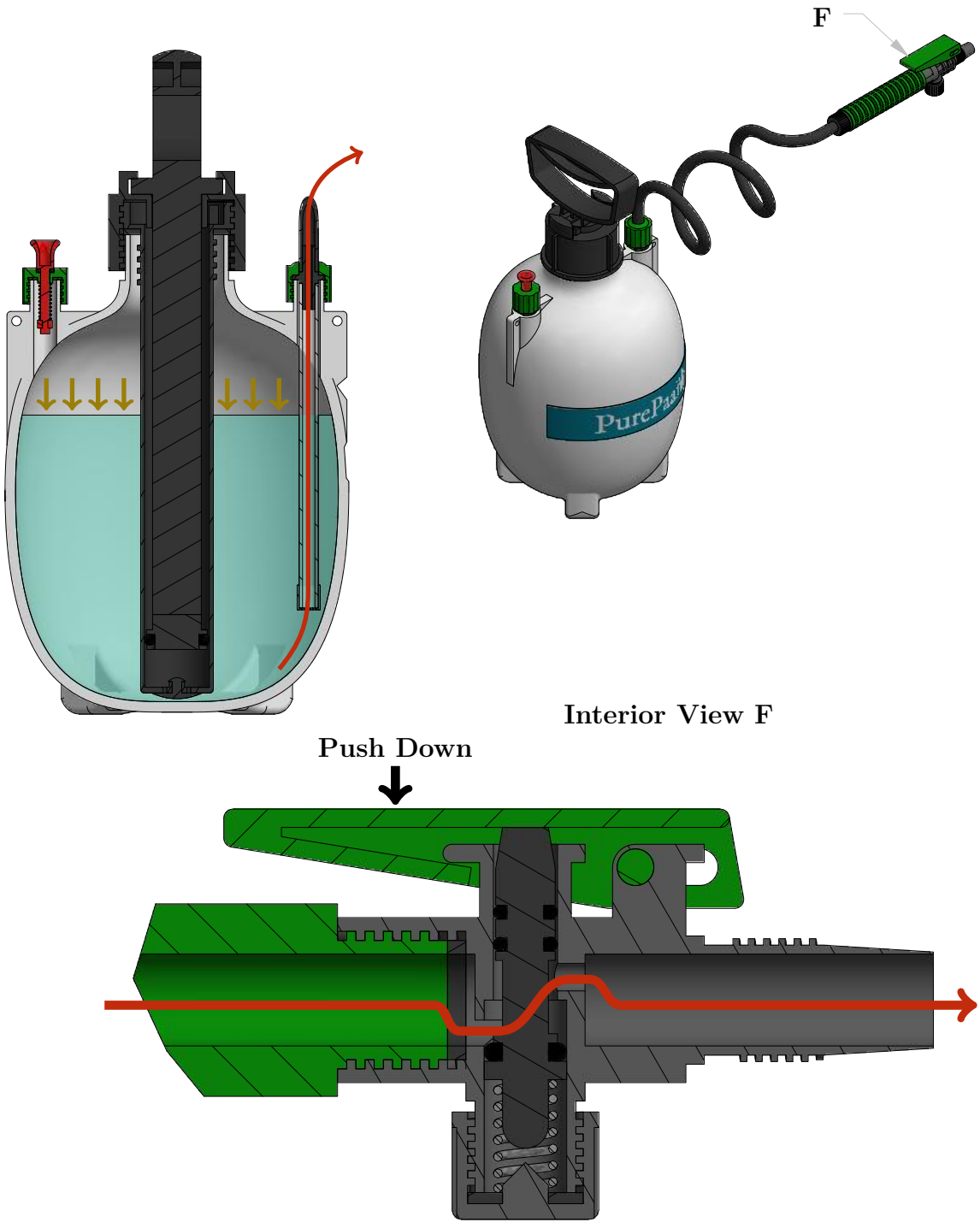



**a.)** As shown in Interior View E, an o-ring is compressed against an upper lip within trigger wand, thereby maintaining an airtight seal within the container.

**b.)** After several upstroke/downstroke cycles, this seal creates a strong positive pressure within the container as more and more air is collected within the upper portion of the container.

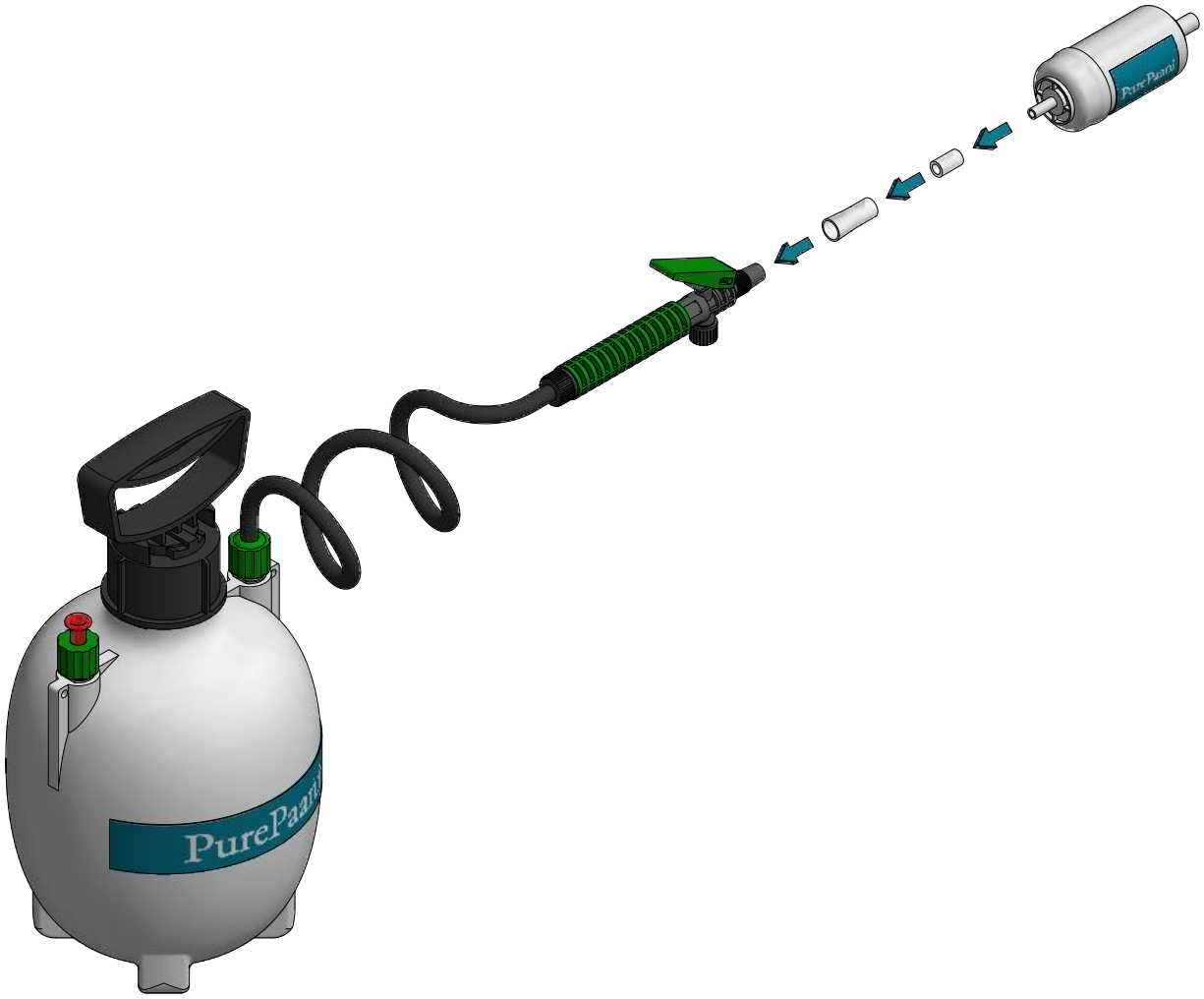
## 2.6) Operation Step F - Release of Water




**a.)** As shown in Interior View F, when the operator pushes down on the trigger, the o-ring is pushed away from the upper lip.

**b.)** This allows water to flow from the container.

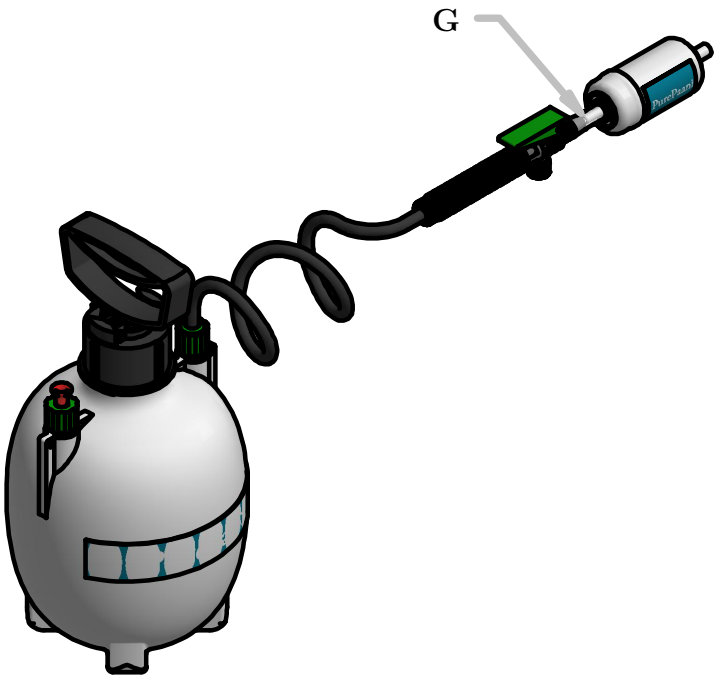
## 2.7) Operation Step G - Attach Ultrafiler

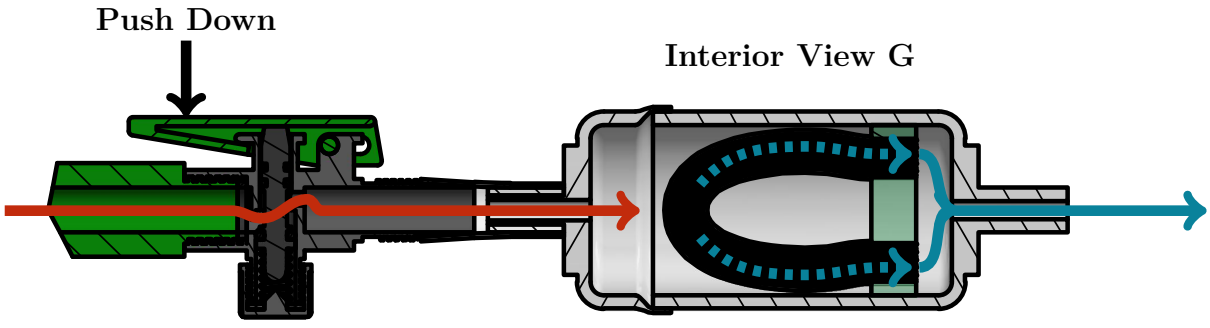



**a.)** The operator releases the trigger, temporarily halting water flow.

**b.)** The operator then attaches an ultrafilter with two differently-sized pieces of flexible, polyvinyl tubing.

## 2.8) Operation Step H - Filter Remaining Water




**a.)** With the ultrafilter attached, when the operator pushes down again on the trigger wand, the water passes through the fibres as shown in section 1.1 - Ultrafilter Details.

**b.)** The water is treated in the ultrafilter and exists from the outlet orifice.