OPERATING INSTRUCTIONS

The ultrafiltration unit is ideal for supplying drinking water to remote locations from both surface and ground water supplies. The unit can be can set up and run by non-technical persons and requires no power or replacement filters to operate.

SETTING UP THE ULTRAFILTRATION UNIT

Select a secure undercover location to set up the ultrafiltration unit sheltered from sun and rain. The site should be located in a well-drained position and include a disposal area for the discharge of the backwash drainage water.

A maintenance person should undertake daily cleaning and servicing of the unit to ensure it's continuous operation. Log sheets should also be completed to record water production and to schedule servicing of the unit.

ASSEMBLING THE ULTRAFILTRATION UNIT

Connect the Cleaning Handles: Connect the two cleaning handles to the top of the ultrafiltration unit. Do this by unwinding the head shaft 3 turns anticlockwise and removing the two temporary bolts. Next, screw the cleaning handles into position making sure they are fully seated.

Attach Legs or Wall Brackets: Attach the legs to the base of the unit or if the unit is to be mounted to a wall, fit the brackets to the back of the unit and fix to the wall (see *Fittings & Accessory Sheet* for details).

Connect Plumbing Fittings: All outlets use 20mm (3/4") BSP connectors and fittings. The taps numbers **T1-Dirty Water In** and **T2-Backwash Out** can be folded down level for use.

Setup Ancillary Connections: Connect hoses and fittings to allow the ultrafiltration unit to function i.e. Taps, pipes, tanks, pumps or other equipment (see *How the Ultrafiltration Unit Works* for details).

- Connect "dirty water in" hose to **(T1-Dirty Wash In)**
- Connect "backwash out" hose to **(T2-Backwash Out)**.
- Connect drinking water "clean water out" hose to **(T3-Clean Water Out).**

OPERATING THE ULTRAFILTRATION UNIT

1) Fill the Unit with Water:

Open **T1-Dirty Water In** and **T4-Vent** and wait till water discharges out T4-Vent**.** The unit is now full **Close T4.**

If water leaks from the head, gently turn the cleaning handles clockwise using just enough pressure to seal the O-rings (do not over tighten).

2) Produce Drinking Water:

Open **T3-Clean Water Out** to commence the flow of drinking water. Sometimes an air-lock occurs slowing water flow - briefly open tap **T6-Air Out** to release any trapped air.

INTERNAL FILTER MODULE

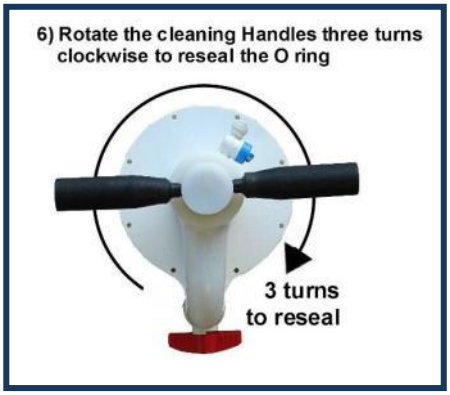
The filter module located inside the ultrafiltration unit and does not need to be accessed or replaced provided it is maintained correctly. With proper care the filtration module should function for a number of years before requiring upgrading.

Regular cleaning of the ultrafiltration unit is essential to prevent the filter module from becoming clogged.

Raw water entering the unit should not contain damaging chemicals and should be pre-filtered to remove solids.

MANUALLY CLEAN THE ULTRAFILTRATION UNIT DAILY

Manual Cleaning Diagrams



Manually clean the ultrafiltration unit daily and more often if needed. Cleaning frequency needs to be increased in response to higher concentrations of contaminations found in the supply water. Follow steps M1 to M8 below:

M1 Close **T1-Dirty Water In** and close **T3-Clean Water Out**. The unit should now be full of water.

M2 Rotate the Cleaning Handles on top of the unit 3 turns anti-clockwise to release the O-ring seals.

M3 Move the Cleaning Handles back and forth vigorously *for 1 minute*. This movement cleans the filter module inside the unit.

M4 Open **T4-Vent** and **T2-Backwash Out** and continue moving the cleaning handles back and forward until the unit drains of water. Close **T2-Backwash**.

M5 **Open T1-Dirty Water In** to fill the unit with water and allow water to discharge out of **T4 Vent** for *2 minutes.* At the same time continue moving the cleaning handles back and forward. **Close T1-Dirty Water In**.

M6 If necessary, repeat Steps M3 to M5 until the water discharging from **T4-Vent** is the same colour as the water entering into the unit through **T1-Dirty Water In**.

M7 Rotate the Cleaning Handles three turns clockwise to reseal the O-rings. Use just enough pressure to seal the O-rings (do not over tighten).

M8 The Manual Cleaning Procedure is now complete. Open **T3-Clean Water Out** to resume drinking water production.

KEEP A DAILY RECORD OF WATER OUTPUT TO MONITOR PERFORMANCE (SEE MAINTENANCE LOG FORMS).

CHEMICALLY CLEAN THE ULTRAFILTRATION UNIT MONTHLY

Chemically clean the ultrafiltration unit monthly of more often if needed. This removes a build up of concentrated organic matter and other contaminates not removed by the manual cleaning process.

CHEMICAL CLEANING USING CHLORINE – UNDERTAKE MONTHLY

Chlorine is used to remove deposits of organic matter form inside the filtration unit.
Follow steps C1 to C8 below using a measurement of chlorine as listed in step C4:

C1 Carry out a MANUAL CLEAN by following **Steps M1 to M6** above.

C2 Undertake **Step M4** of the MANUAL CLEAN to leave the unit empty of water.

C3 Add water to the Chemical Tank (3/4 full).

C4 **Add chlorine (see amount below)** to the chemical tank and stir until dissolved. This should create a 0.2% chlorine solution inside the filter housing. See manufacturer's label on product for available chlorine concentrations.

Chlorine powder with 65% available chlorine (700g / kg of chlorine) **= 4 Teaspoons**
OR
Chlorine powder with 55% available chlorine (550g / kg of chlorine) **= 6 Teaspoons**
OR
Chlorine powder with 35% available chlorine (350g/kg of chlorine) **= 8 Teaspoons**
OR
Chlorine powder with 25% available chlorine (250g / kg of chlorine) **= 10 Teaspoons**
OR
Liquid chlorine (Sodium Hyprochlorite) with 12% available chlorine **= 200 millilitres**

C5 Open tap **T5-Chemical** and allow the **chemical tank** to drain, close tap **T5-Chemical**.

C6 Open **taps T1-Dirty Water In** & **T4-Vent** and allow the unit to fill with water then close both taps when water spills out of tap **T4-Vent**.

C7 Move the Cleaning Handles back and forth a few times. This mixes the chlorine inside the unit. Leave to **soak for 4 hours**.

C8 Carry out **Manual Clean Steps M1 to M8**. After completion the unit can be returned back to producing drinking water again.

CHEMICAL CLEANING USING CITRIC ACID – UNDERTAKE MONTHLY

Undertake after completing a CHEMICAL CLEAN USING CHLORINE (above).
Citric acid is used to remove iron and manganese deposits from inside the filtration unit.

Step 1 Complete a CHEMICAL CLEAN USING CHLORINE (as above) followed by step M4 of the MANUAL CLEAN procedure (to make sure the unit is empty of water).

Step 2 Next, undertake steps C3 and C4 (as above) then add **500 grams of Citric Acid** powder to the chemical tank in step C4 (instead of chlorine).

Step 3 Finally complete steps C5 to C8 (as above), but in step C4 **leave the citric acid to soak for 12 hours** (not 4 hours)**.** This procedure is now complete.

Safe Use of Chemicals: *Follow manufacturer's safety instructions. Avoid contact with skin and wear protective gloves, eyeglasses and clothing. Do not inhale fumes.*

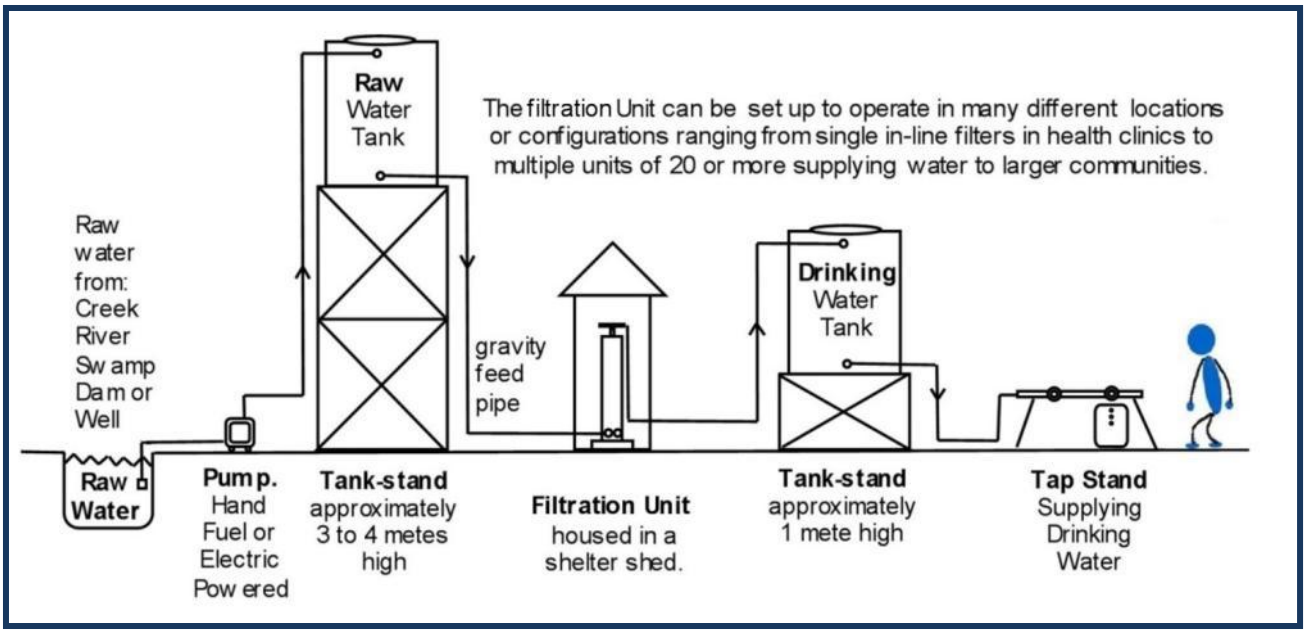
HOW THE ULTRAFILTRATION UNIT WORKS

The ultrafiltration unit requires no power to operate instead it relies on the flow of water from gravity pressure. Raw water flows through the unit with a water head pressure of between 2 metres and maximum 4 metres (20 kpa to 40 kpa or 3 psi to 6 psi) to produce a typical flow rate of 500 to 700 litres of drinking water per hour (subject to the quality of source raw water).

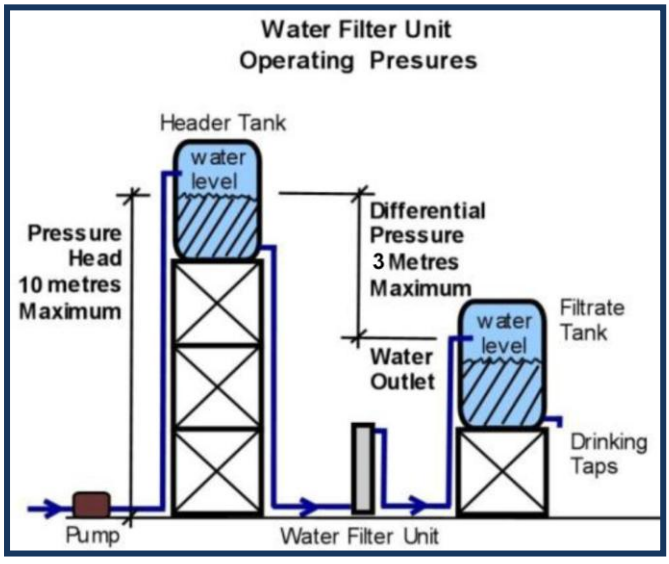
The ultrafiltration unit can be set up in a number of different ways to best accommodate site needs. A popular method is to pump raw water (using mechanical or hand pump) to a 1,000 litre header tank located on a 3 meter high tank-stand and allow the water to gravity feed through the ultrafiltration unit and collect in a 1,000 litre drinking water tank located on a 1 meter high tank stand.

The drinking tank can be connected with taps or be fitted with pipes for supplying water directly to houses through a distribution network.

Never pump or connect mains water pressure directly to the ultrafiltration unit without using a suitable water pressure regulating or control device as excessive water pressure may damage the filter fibres.



SITE REQUIREMENTS



For the ultrafiltration unit to function it requires additional operating equipment. This may include hoses, pipes, pumps, taps, tap stands, float valves, water bladders, tanks and tank stands.

The amount of additional equipment depends on the installation being undertaken and individual sites requirements.

Installations where existing roof top water tanks are available allows the ultrafiltration unit to become an “in line filter”. Simply connect to the existing water supply system. Other types of installations will require more extensive site work and equipment.

It is important when setting up the ultrafiltration unit to ensure correct sizing of pipes, pumps and other equipment.

MAKING SURE THE FEED WATER IS SUITABLE FOR ULTRAFILTRATION

Not all water is suitable for filtering through the Ultrafiltration Unit (UF) and testing for unsuitable contaminates should be undertaken before use.

- **YES – Diseases Removed:** The ultrafiltration unit will significantly remove biological contaminates and pathogens including bacteria, viruses, protozoa, cysts, parasites etc. making water safe to drink.
- **YES – Turbidity Removed:** The ultrafiltration unit will remove turbidity and dirt from water. Dirty water can however damage the filter fibres and it is recommended to install a pre-filter.
- **NO – Chemicals Not Removed:** The ultrafiltration unit will not remove salt or dissolved chemicals and minerals from water.

FLUSH CHLORINE SOLUTION THROUGH WATER PIPES & CONTAINERS TO PRVENT DISEASES

It is good practice to soak and flush water pipes drinking containers, hoses, taps, and other equipment with a 0.1% (1,000 parts per million) chlorine solution to eliminate any residual or accidental contamination. Add approximately 1 teaspoon of chlorine powder to 5 litres of water and use this to flush through pipes or wash drinking water containers.

It is also recommended to regularly flush a chlorine solution through the ultrafiltration unit and out through the drinking water hose to eliminate any reverse contamination.

PRE-FILTRATION TREATEMENT

It is highly recommended that a pre-filter be installed to reduce solids from fouling the internal filter module when using a highly turbid water source.

A 500-micron pre-filter is suitable however a 200 micron (80 mesh) pre-filter will provide better protection. Pre-filters also require regular cleaning to maintain a good water flow.

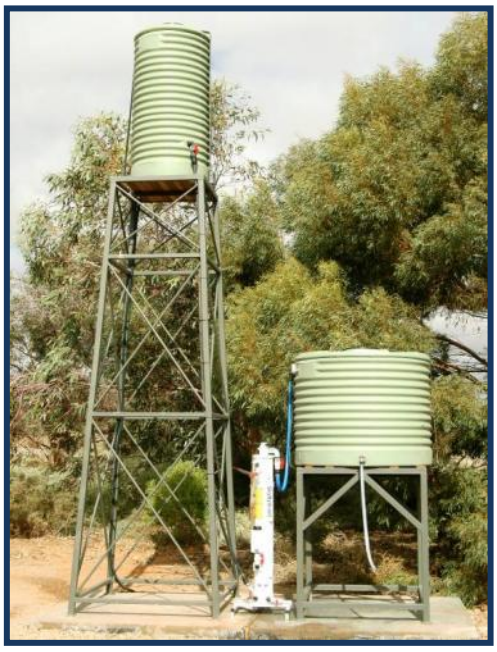
MULTIPLE FILTRATION UNITS

Multiple connections of ultrafiltration units (2 or many more) can be undertaken to significantly increase water production when required.

Multiple connection kits are available or locally available plumbing supplies can be used to manifolded ultrafiltration units together.

Each ultrafiltration unit is capable of producing up to 10,000 litres of drinking water per day and additional units will multiple this quantity.

Water production will vary significantly depending on the quality of the raw water available. Turbid and highly contaminated water will reduce output as well as increasing the frequency of cleaning cycles.



ULTRAFILTRATION UNIT SETUP

The ultrafiltration unit can be set up to operate as single stand alone unit (pictured above) or manifolded together into multiple units for high flow production (pictured previous page).

The supply of raw water to ultrafiltration unit can be sourced from gravity feed overhead tanks or by using pressure reducing devices when supplied directly from pumps or pressure supply pipes.

Operating pressure should be limited to (20 kpa to 40 kpa or 3 psi to 6 psi) or about 2 to 4 meters head pressure to produce a typical flow rate of about 500 to 700 litres per hour per unit.

Drinking water produced from the ultrafiltration unit can be stored in tanks and connected to taps or be piped to household supplies.

KEEPING DRINKING TANKS SAFE

Water produced from the ultrafiltration unit filtration unit is free of biological organisms and safe to drink. Storing this water in tanks may cause deterioration in quality. In hot climates, water stored in tanks may stay safe for days while in colder climates it may stay safe for weeks.

To maintain water quality it is good practice to regularly disinfect drinking water tanks and water pipes with a small amount of chlorine to prevent the growth of unwanted organisms and pathogens in the stored water.

Add sufficient chlorine into drinking water tanks to maintain a residual free chlorine level of between 0.2 to 0.5 milligrams per litre (mg/l). Use a water testing kit every few days to monitor the chlorine levels and make adjustments to the chlorine levels as necessary.

As a guide for every 1,000-litres of tank water, add about 3/4 teaspoon of chlorine powder (at 65% available chlorine) or 1 1/2 teaspoons of chlorine powder (at 35% available chlorine). First, mix the chlorine in a small bucket of water to make a solution before adding to the water tank.

OPERATION LOG SHEET

It is good practice to keep a daily operational log-sheet (see Log Sheet on the last page of these Operating Instructions) to record drinking water production flow rates and when cleaning procedures were undertaken.

This is useful to identify a pattern of use when monitoring ongoing performance trends or to determine if operational problems may be occurring. It is also useful as a convenient reminder of when the next cleaning cycle is due to be undertaken, particularly when a cleaning roster is being used.

ULTRAFILTRATION UNIT ACCESSORY KIT

1 HANDLES

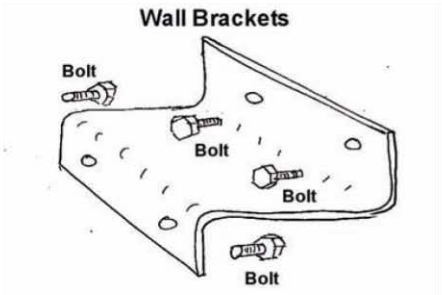
Rotate the top of the head assembly 3 turns anti-clockwise and remove the 2 temporary bolts. Screw the handles in position making sure they are fully seated.

2 T6 VALVE

Remove the plug in head assembly and screw in T6 Valve using thread tape.

3 WALL BRACKETS

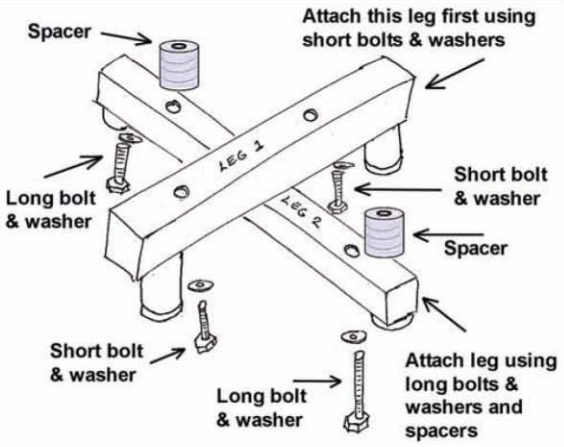
Use the wall brackets in addition to the leg brackets if required.

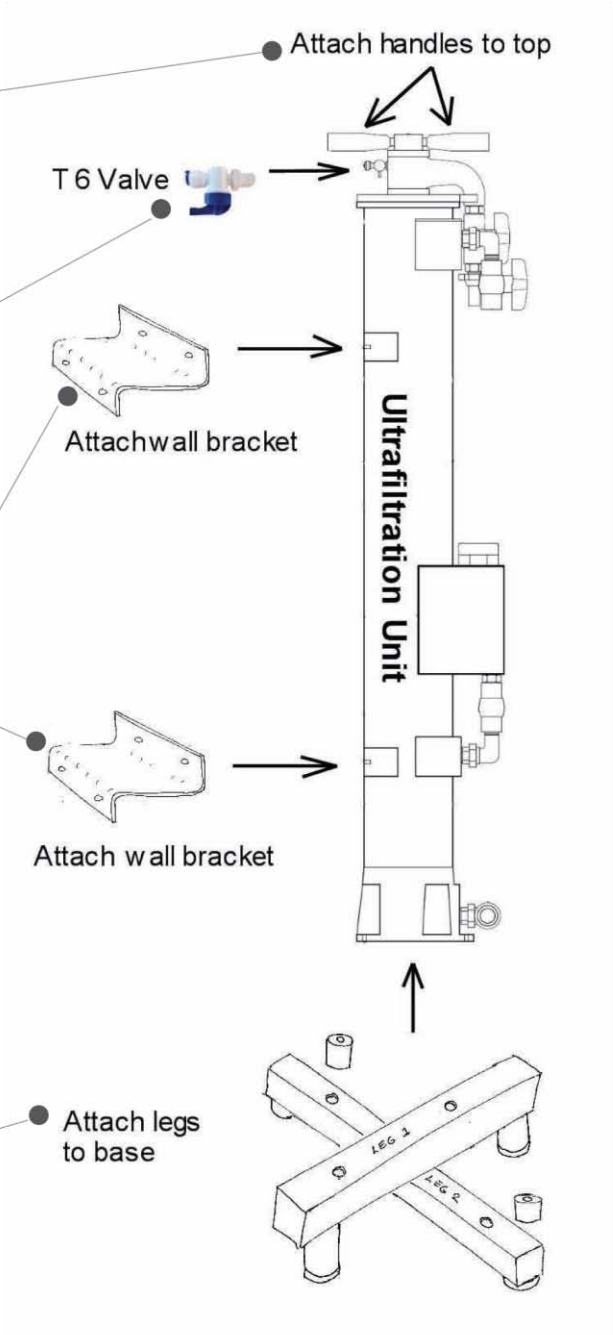


and/or

LEG BRACKETS

Attach leg brackets to base of ultrafiltration unit using bolts & spanner supplied.





Spoon & Stirrer stick: Use to measure and mix chemicals for the chemical tank.

"O" Rings: Spares supplied.

Plumbing Fittings: Spare plumbing fittings and plumbers tape are included to assist in setting up the filtration unit onsite.

OPERATION LOG

TIME	DATE	DRINKING WATER PRODUCTION (LITRES)	MANUAL CLEANING UNDERTAKEN	CHEMICAL CLEANING UNDERTAKEN	AMOUNT CHLORINE USED	OTHER INFORMATION OR NOTES