

SkyHydrant™

WATER PURIFICATION UNIT

**CONTAINED
ENERGY**

Operating Instructions

The SkyHydrant water purification unit provides a stand-alone system for supplying clean safe drinking water for disasters, emergencies and humanitarian programs.

All operations are simple and easy to undertake and the unit can be set up for use in refugee camps, communities, villages, instructional facilities, health clinics, schools, orphanages and many other applications where poor quality water needs to be upgraded to high quality drinking water.

Where to set-up the SkyHydrant

To avoid theft, vandalism or damage select a fenced secure location to install the SkyHydrant sheltered from the sun, wind and rain.

- Mount the SkyHydrant in a sturdy position with sufficient space around the unit to allow for cleaning and maintenance.
- Provide good access to allow people to line up and collect their drinking water without causing problems. Ensure the location is clean and well drained to avoid mud puddles and provide a disposal area for the backwash water.
- The SkyHydrant water purification unit is a valuable asset and requires daily care for its continued operation. A local supervisor should be appointed to oversee operations and provide security. A daily operational log of water production should also be maintained.

Assembling the SkyHydrant

Screw the Cleaning Handle into the top of the SkyHydrant before operating the unit. One handle is already located in position while the other needs to be screwed into place.

The SkyHydrant can be set up to operate as either a wall mounted unit using the brackets supplied or as a freestanding unit using the aluminium legs supplied. Bolts and screws are included in the accessory kit allowing the brackets or legs to be easily connected.

All fittings use 20mm (3/4") connectors and lengths of flexible hoses, clamps and fittings are supplied to assist with setting up and connecting pipes. Taps **T1** and **T2** are adjustable allowing them to be folded down level.

Connect required operating equipment to allow the SkyHydrant to function – this may include hoses, pipes, water tanks, pump and other equipment.

Connect the dirty (raw) water pipe to (**T1**) connect the backwash pipe to **T2** and connect the drinking water outlet pipe to (**T3**).

It is good practice to soak and flush 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.



Internal Filter Module

The filter module is permanently located inside the SkyHydrant and does not need to be accessed or replaced providing it is maintained in accordance with instructions and the raw water entering the unit does not contain any sharp objects or unsuitable chemicals, minerals or excessive turbidity.

Regular cleaning of the SkyHydrant is essential for maintaining a continuous flow of drinking water.

Operating the SkyHydrant

To ensure the correct flow of water is maintained turn all taps off before commencing each operating procedure:

Fill the SkyHydrant with Water:

Open **T1** (dirty water in) & **T4** (vent) to fill the SkyHydrant with raw water and close **T4** (vent) when water flows out. Briefly open then close tap **T6** (air purge) to clear the lines of any trapped air.

Produce Drinking Water:

Open **T1** (dirty water in) and **T3** (clean water out) to commence the flow of drinking water.

Manual Cleaning (Daily):

Undertake manual cleaning at least once a day or more often if the flow of drinking water slows. Manual cleaning is carried out while the AquaSentry is full of water. Don't forget to turn all taps off before commencing.

- 1) Rotate the Cleaning Handles three turns anticlockwise to release the O ring seals.
- 2) Move the Cleaning Handles back and forth vigorously for 1 minute. This agitates and cleans the filter module located inside the SkyHydrant. Some leakage may occur around the rotating shaft while cleaning is undertaken – this is not a problem.
- 3) Open **T4** (vent) & **T2** (backwash out) to allow the backwash water to drain away and continue moving the Cleaning Handles until the backwash is complete.
- 4) If necessary, repeat the manual cleaning procedure until the wastewater from **T2** (backwash out) is the same colour as the dirty (raw) water passing into the unit through **T1** (dirty water in).
- 5) Rotate the cleaning Handles three turns clockwise to reseal the O rings.
- 6) The "Manual Cleaning Procedure" is now complete and the unit can again be refilled water.

Chemical Cleaning (Monthly):

Undertake chemical cleaning once a month or more often if the flow of drinking water slows.

Chemical Cleaning is undertaken using chlorine to remove organic and other matter not easily removed by the "Manual Clean".

Chlorine comes as dry granules e.g. calcium hypochlorite (bleaching powder) or a liquid e.g. sodium hypochlorite. Make up a chlorine solution of 0.1% (1,000 parts per million) by following the procedure below.

When handling chlorine keep safe by wearing protective gloves, eyeglasses and clothing and do not inhale the chlorine. Chlorine is a dangerous chemical and if injured wash area thoroughly with water and seek medical attention.

Manual Cleaning Diagrams

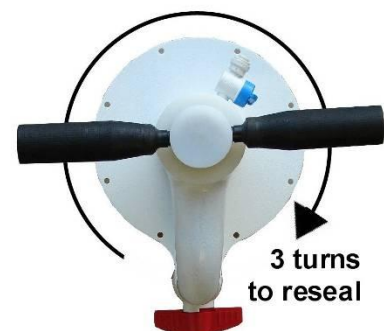
- 1) Rotate the Cleaning Handles three turns anticlockwise to release the O ring seal



- 2) Move the Cleaning Handles back and forth vigorously for 1 minute to clean



- 6) Rotate the cleaning Handles three turns clockwise to reseal the O ring



Chemical Cleaning undertaken monthly (continued)

- 1) Undertake a "Manual Clean Procedure" but leave the unit empty (do not refill).
- 2) Add water to the Chlorine Tank until $\frac{3}{4}$ full.
- 3) Add chlorine to the chlorine tank (see teaspoon amounts below) and use a mixing stick to stir until dissolved:

2 Teaspoons of Chlorine powder with 65% available chlorine (700g / kg).

OR

3 Teaspoons of Chlorine powder with 55% available chlorine (550g / kg).

OR

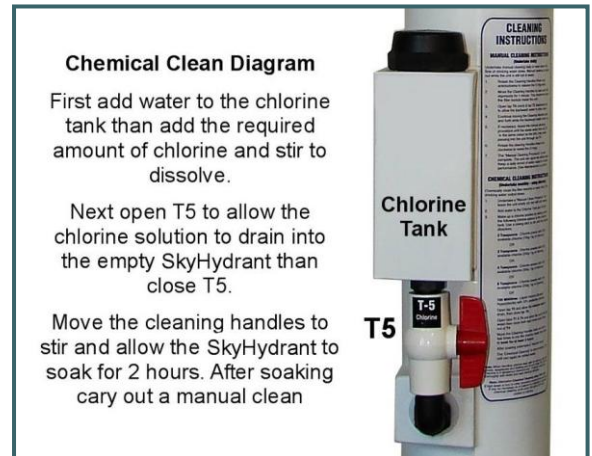
4 Teaspoons of Chlorine powder with 35% available chlorine (350g / kg).

OR

6 Teaspoons of Chlorine powder with 25% available chlorine (250g / kg).

OR

100 Millilitres of Liquid chlorine (Sodium Hypochlorite) with 12% available chlorine.

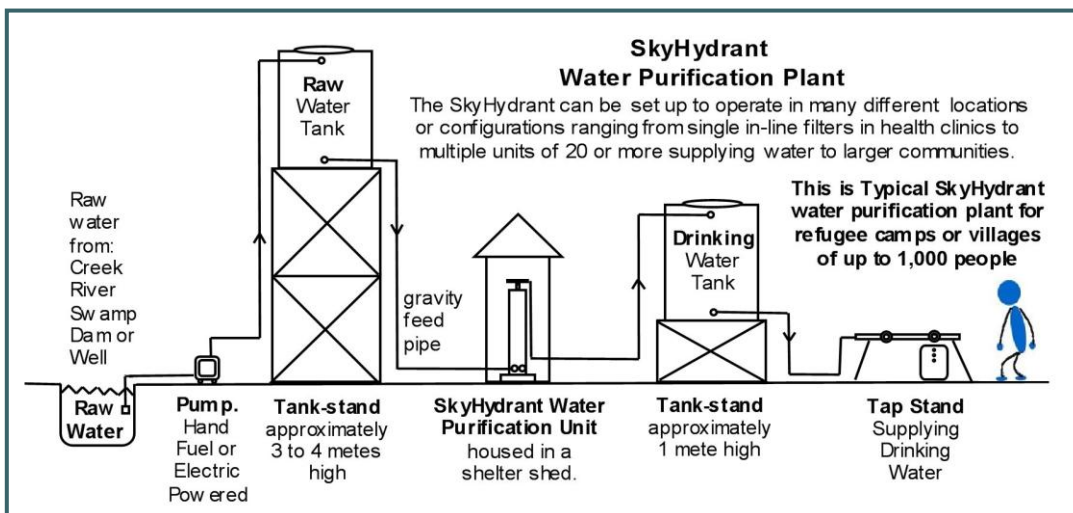


- 4) Open **T5** (chlorine) to allow the **chlorine tank** to drain, than close **T5**.
- 5) Fill the AquaSentry with water by opening **T1** & **T4** until water flows out of **T4** than close both taps.
- 6) Move the Cleaning Handles back and forth a few times to mix the chlorine inside the unit than leave to **soak for at least 2 hours**.
- 7) After soaking, undertake a "Manual Clean" to remove the chlorine solution.
- 8) The "Chemical Cleaning" is now complete. The unit can again be refilled water.

Chemical Cleaning using Citric Acid. If high levels of Iron are present undertake periodic chemical cleaning using 500 grams of Citric Acid instead of chlorine. Citric acid cleaning is undertaken in addition to the regular chemical cleaning program using chlorine.

How the SkyHydrant works.

The SkyHydrant water purification unit requires no power to operate instead it relies on gravity water pressure. Raw water flows through the unit with a water head pressure of between 2 metres and maximum 4 metres (0.2 bar to 0.4 bar 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).



There are many ways of setting up SkyHydrant water purification plants. A popular method is to pump raw water (using mechanical or hand pump) to a 1,000 liter header tank on a 3 meter high tank-stand and allow the water to gravity feeding down through the

SkyHydrant into a lower 1,000-liter drinking water tank located on a 1-meter high tank-stand.

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

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

Site Requirements.

For the SkyHydrant to function it requires additional operating equipment including hoses, pipes, pumps, taps, float valves, water bladders, tanks, tank-stands, taps and tap 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 SkyHydrant to become an "in line filter" connected to the existing water supply system while other installations will require more extensive site work and equipment.

It is important when setting up SkyHydrant water purification plants to ensure correct sizing of pipes, pumps and other equipment.

Suitability of Local Water.

Not all water is suitable for filtering through the SkyHydrant purification unit and testing for unsuitable contaminants should be undertaken before use. Contact your local water testing laboratory or water agent for assistance and carefully evaluate the surrounding watershed area to identify potential harmful pollutants such as upstream industrial areas, intensive agricultural or wastewater effluent areas.

YES - The SkyHydrant **will significantly remove** biological contaminants and pathogens including bacteria, viruses, protozoa, cysts, parasites etc making the water safe to drink.

YES - The SkyHydrant **will remove** turbidity and dirt from water. However, the dirtier the water, the more often the filter needs cleaning to remove the build up of sediments on the filter fibres.

If
C
unsafe levels, your water may not be suitable for filtering and drinking.

Adding Chlorine to Drinking Water Tanks.

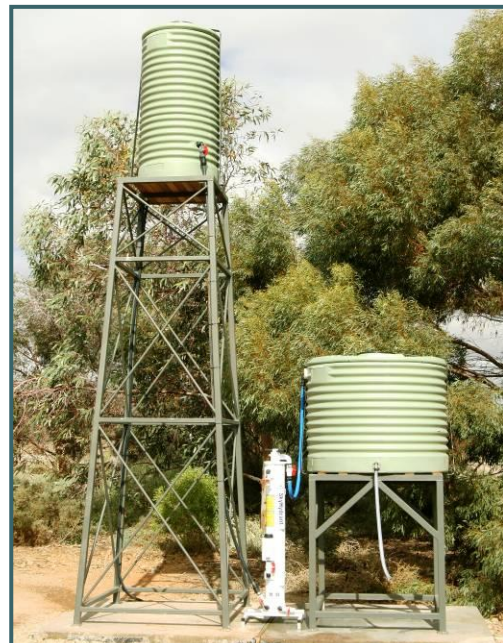
Water produced from the SkyHydrant purification unit is free of biological organisms and safe to drink however, prolonged storage of this water in tanks may cause deterioration in quality. In hot climates, tank water may stay safe for a few days whereas in colder climates it may stay safe for weeks. To maintain water quality it is good practice to 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.

Help and Support

Keep in touch with your local SkyJuice organisation or representative. Networking with local operators will help resolve most issues. The SkyJuice Foundation is also available for support and assistance and don't forget to send or email us your water project story to us together with photos and be included in the SkyJuice Water Projects web page.



SkyHydrant Set Up Options

SkyHydrants can be set up to operate as single stand alone units (pictured above) or manifolded together into multiple units for high flow production (pictured below).

Raw water to SkyHydrants can be supplied by gravity feed overhead tanks or by pumps and mains pressure using pressure reducing

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



