DAYLIFF TURITAP AUTOMATIC WATER CHLORINATION DOSER INSTALLATION & OPERATION MANUAL

know H_2Ow through experience

in partnership with

Mangrove Water

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1. Device Overview

The Dayliff TuriTap is an automatic chlorine doser that can disinfect drinking water supplies without requiring electricity or daily user input. The TuriTap uses liquid chlorine (e.g., Dayliff H_2O Guard, Waterguard, Aquaguard, or chlorine solution between 0.5 to 6% produced by electrochlorination) and can be connected to water taps or storage tanks with flow rates ranging from 0.3 to 3.6 m^3/hr. The concentration of chlorine added can be easily adjusted to accommodate taste and odor preferences; the recommended target range is between 0.2-2.0 ppm to ensure that sufficient residual chlorine is present to protect water supplies from recontamination.

Dayliff Turitap can also be used for dosing any other liquid chemical for various applications with the advantages of being a proportional doser and non-powered.

1.1. TuriTap Parts & Components

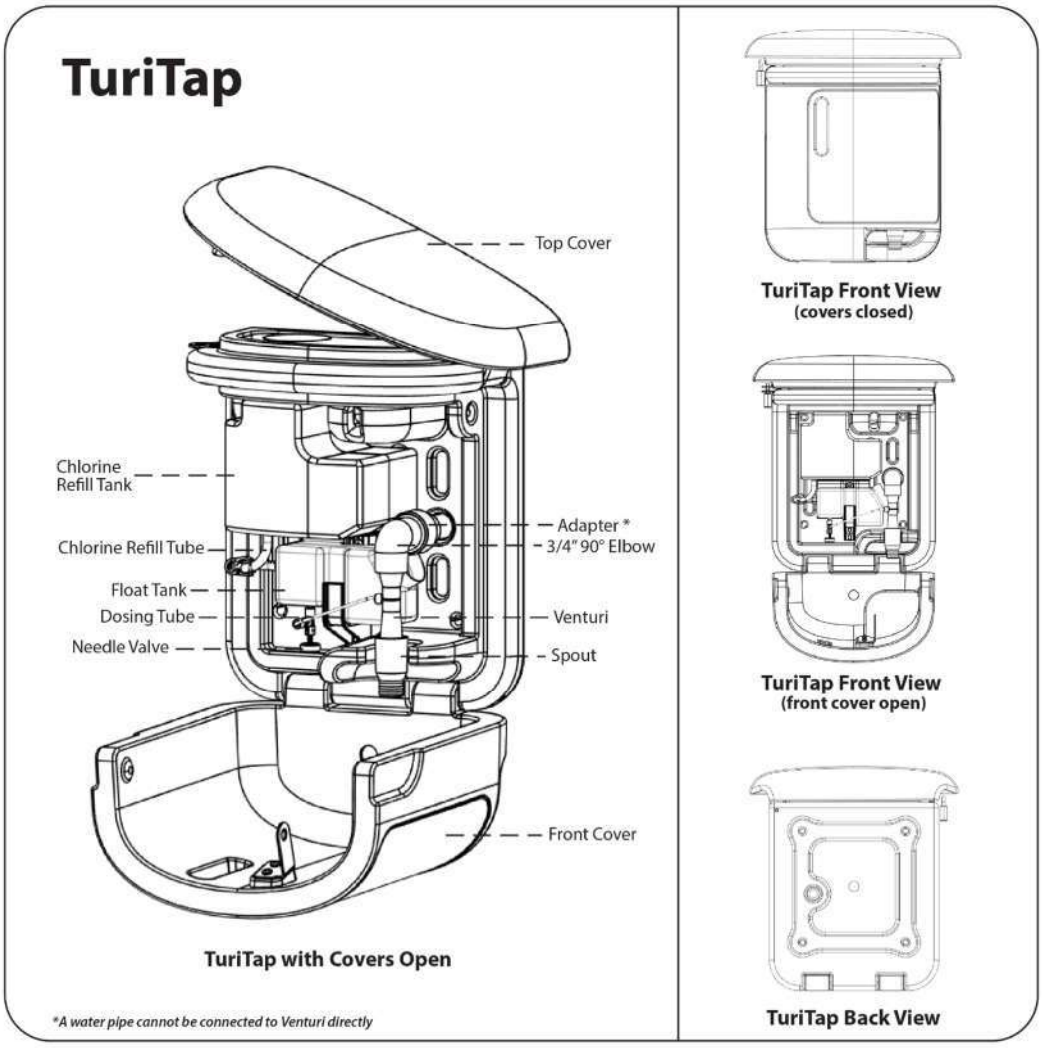

Figure 1: TuriTap Overview

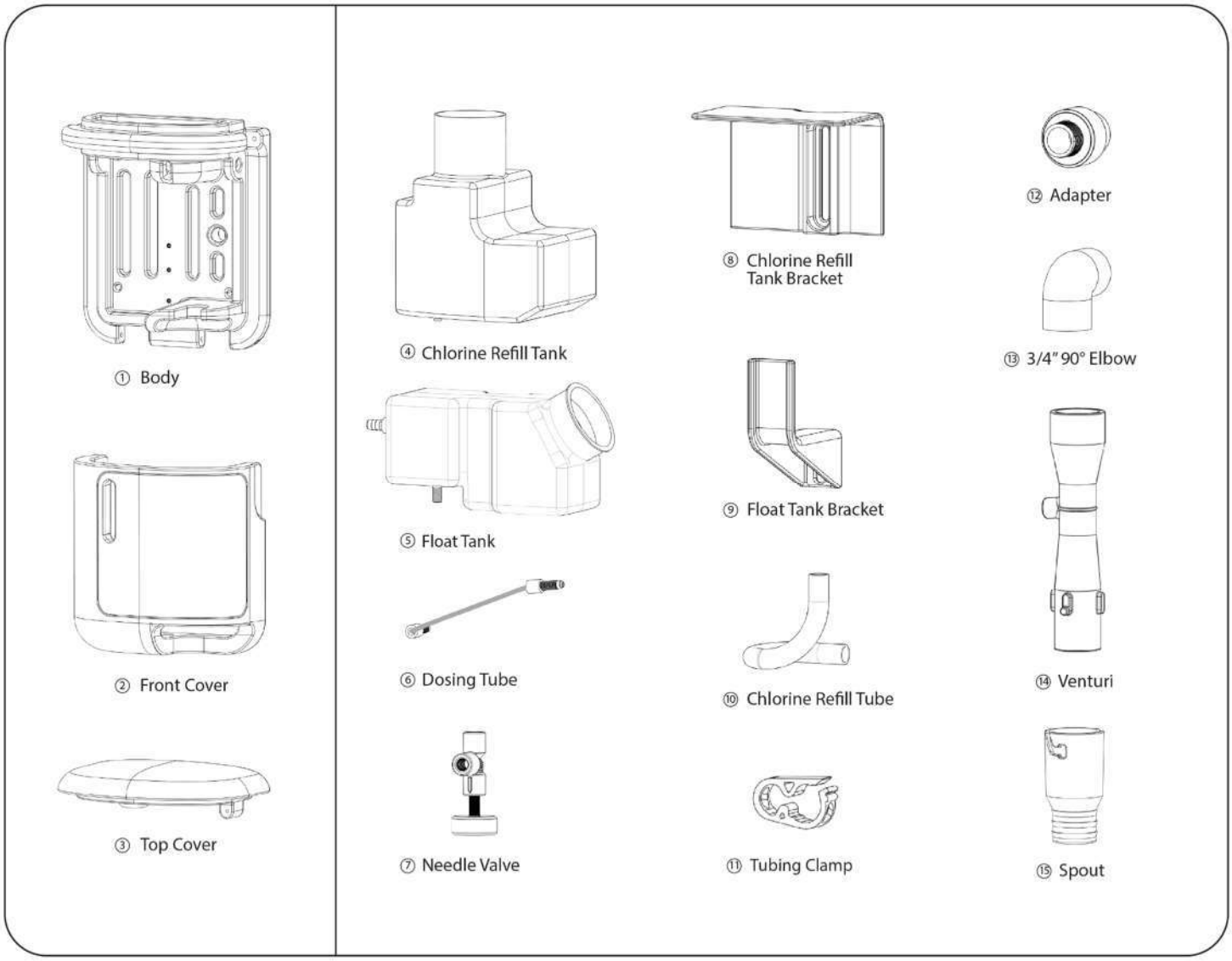

Figure 2: TuriTap Parts

Table 1: TuriTap Part List

Part	Function
1. Body	A panel where all device components are placed
2. Front Cover	Covers the device and provides a window to see chlorine levels
3. Top Cover	Covers the top of the device
4. Chlorine Refill Tank	Holds 2L of liquid chlorine
5. Float Tank	Ensures chlorine is level with Venturi
6. Dosing Tube	Connects float tank to Venturi
7. Needle Valve	Regulates chlorine dosing
8. Chlorine Refill Tank Bracket	Holds the chlorine refill tank in place
9. Float Tank Bracket	Holds the float tank in place
10. Chlorine Refill Tube	Connects chlorine refill tank to float tank
11. ¾” 90° Elbow	Connects inlet pipe to Venturi
12. PPR Adapter	Connects PVC elbow to standard PPR pipe
13. Venturi	Doses chlorine into influent water proportional to flow rate. This suction phenomenon, known as the “Venturi effect,” results from the component’s geometry, which causes a vacuum (pressure drop) as fluid accelerates through the constriction
14. Spout	Reduces splashing during water collection and allows users to attach flexible hoses to collect water

The direction of chlorine flow through the TuriTap device is shown below. Chlorine flows from the chlorine refill tank to the float tank, through the needle valve, and into the Venturi, where it mixes with influent tap water to produce disinfected drinking water.

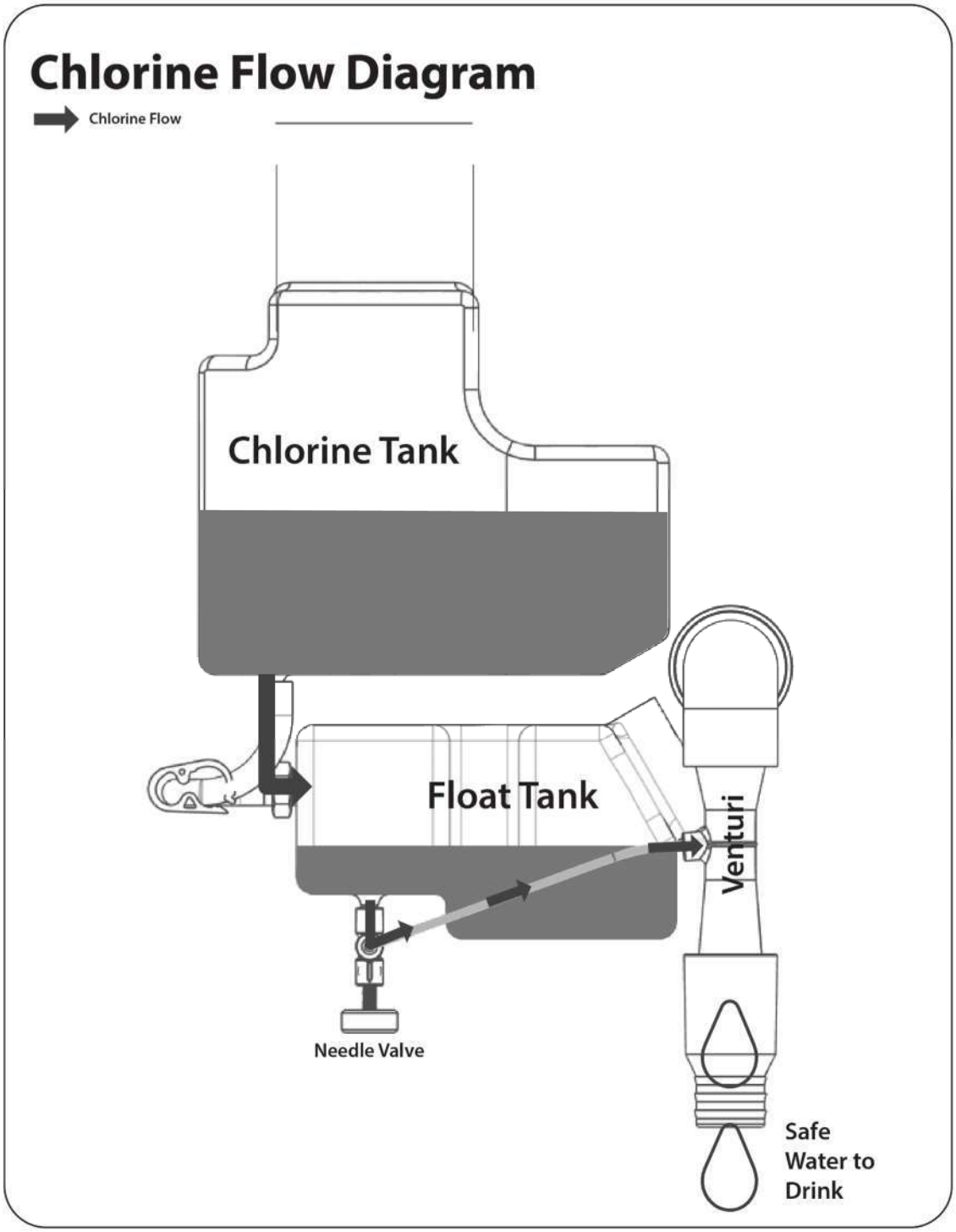

Figure 3: Chlorine Flow through TuriTap

1.2. Water Infrastructure Compatibility

Incompatible Infrastructure: Currently, the TuriTap cannot be installed directly in-line at boreholes, dugwells, and/or tubewells. A TuriTap model compatible with manual handpumps is in development.

Compatible Infrastructure: The TuriTap can be installed at the outlet of pipes, including wall-mounted taps (e.g., kiosks, indoor or outdoor tap connections), free-standing taps, or taps connected to ground-level or elevated water storage tanks, or at the inlet of elevated water storage tanks (see Figure 4). The TuriTap is compatible with variable water flow rates ranging from 0.3 -3.6 m^3/hr. *No pipes should be directly attached to the Venturi outlet (the spout must be in place). Attaching any pipe or tubing directly to the Venturi water outlet (instead of to the spout) will negatively affect chlorine dosing. If you need to direct water from the TuriTap into a container, you can attach a flexible hose less than 1 meter in length to the spout piece (see Figure 7).* Please refer to *Section 2: Device Installation* for more information on how to install the TuriTap for each type of infrastructure.

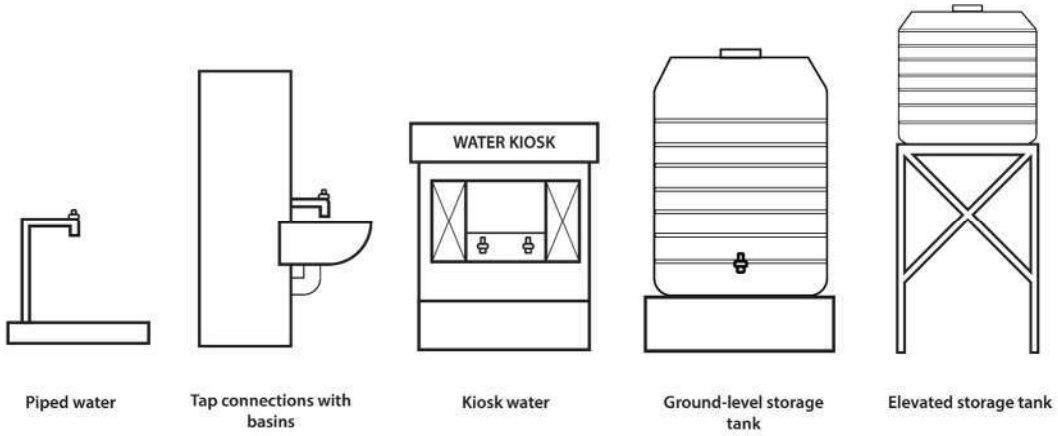

Figure 4: Compatible Infrastructure with the TuriTap

Figure 5: Examples of TuriTap Installations in Diverse Infrastructure

1.3. Influent (Source) Water Quality Parameters

The table below shows the desired range for different water quality parameters of the source water where the TuriTap can be installed. The TuriTap only doses chlorine to disinfect water supplies. The TuriTap

requires the influent water source, storage tank, and/or piping to have low turbidity and low iron levels for proper function. The TuriTap does not address other chemical water quality concerns such as arsenic, fluoride, total dissolved solids, etc.

Table 2: Source Water Quality Parameters

Source Water Quality Parameter	Influent (Source) water Desired Parameter Range (ppm = mg/L)
Turbidity	< 5 NTU
Iron	< 0.3 ppm Fe
pH	6.5-8.0

2. Device Installation

2.1. Mounting the TuriTap

1. The enclosure needs clearance of about 523 mm above the influent tap and 190 mm below. Ensure that the chosen mounting location does not interfere with windows or shutters above, and that there is ample clearance below for water collection containers like jericans. It is recommended to have at least 600 mm of space between the TuriTap outlet and the ground level. The TuriTap should also be installed at a location that allows the front door to open freely (610 mm of clearance).

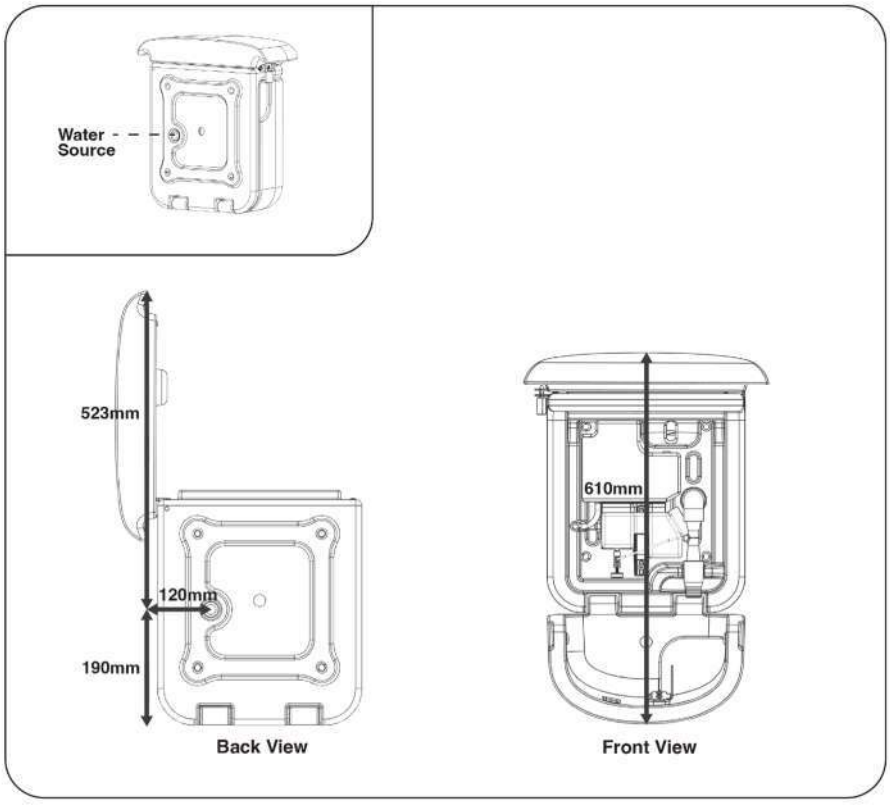

Figure 8: Enclosure door clearance

2. Remove the existing tap, if applicable, and connect the water supply pipe to the TuriTap through the inlet hole in the back of the enclosure. A ¾" PVC elbow and ¾" PPR and PVC male-threaded adapter are provided to connect the TuriTap to the water supply pipe. Any pipe or combination of pipes may be used in the horizontal pipe section leading to the Venturi (upstream of the 90° elbow).
3. A flow control valve, such as a gate valve or ball valve, needs to be installed upstream of the TuriTap to turn the water flow on and off. Install the flow control valve in a visible and accessible location for users so they can control the water supply. Flow control valves which are installed directly behind the TuriTap can be difficult for first-time users to locate, so it is recommended to install valves to the side of the TuriTap so they are visible.

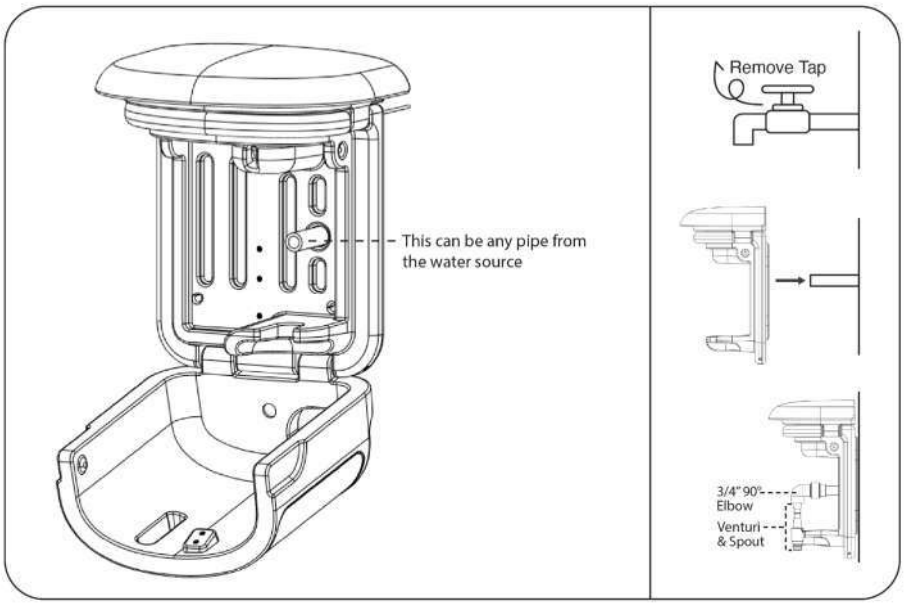

Figure 9: Inserting a piped connection through the TuriTap enclosure

2.1.1. Mounting the TuriTap to a Wall

1. The enclosure can be mounted to any wall with a tap connection coming from it. Center the inlet hole in the back of the enclosure with the water supply pipe.
2. Ensure that all four mounting points on the enclosure are used and that the device is upright and flush against the wall. Standard 8 mm diameter bolts or screws that are at least 65 mm long can be used to attach the TuriTap against a wall or support structure.
3. Install the valve for turning on water flow in a visible and accessible location for users.

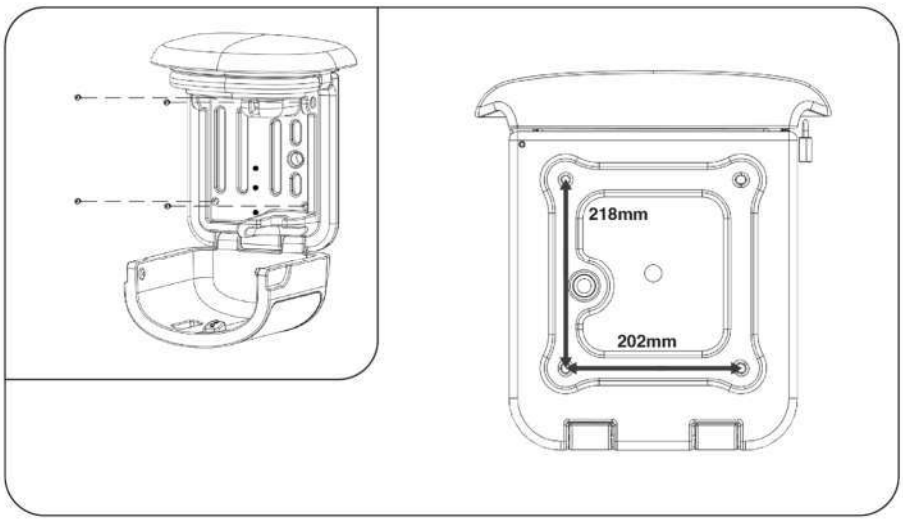

Figure 10: Mounting hole positions for TuriTap enclosure

2.1.2. Mounting the TuriTap at a Free-Standing Tap or Inlet to a Tank

A free-standing support structure or frame may need to be constructed locally to give a place for the TuriTap to be mounted when installing at a free-standing tap connection or at the inlet to a water storage tank. Guidance for constructing a custom frame with examples is below; frames can be tailored to the installation context.

1. Assess the point where you want to install the TuriTap, including taking key measurements (e.g. distance between the ground level and tap connection).
2. Construct a custom frame locally which the TuriTap can be mounted to. We recommend constructing the frame locally available (e.g. 1”-2” angle iron or metal tubes are often a suitable choice for most contexts).
    a. Create a rectangular frame for the TuriTap to be mounted to. The rectangular frame should include four holes that are at least 10 mm in diameter and spaced 218 mm x 202 mm apart to match the mounting holes on the back of the TuriTap enclosure (Figure 11). If using angle iron, a skilled welder should be able to attach the pieces.
    b. Attach free standing legs to the square back frame. For free-standing tap connections, we recommend attaching legs which are 800 mm long to give 600 mm clearance for containers to be placed under the TuriTap and at least 200 mm to be anchored into the ground. The legs should be anchored with longer lengths for expansive and sandy soils.

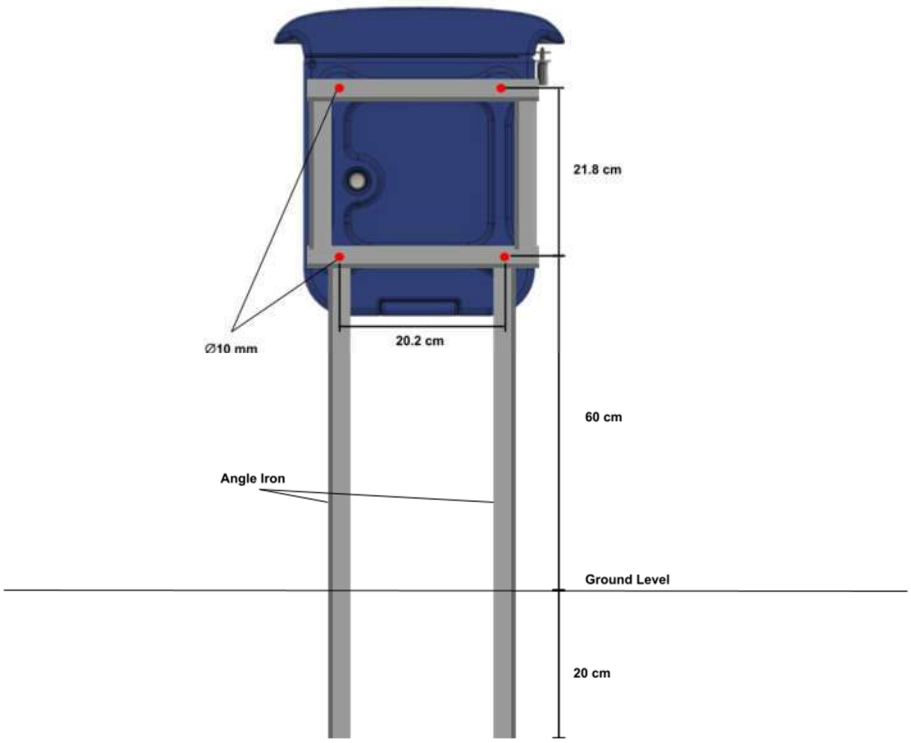

Figure 11: Free-standing TuriTap frame dimensions

3. For free-standing tap installations, the legs of the frame should be anchored into the ground with a concrete footing at least 200 mm below the ground level. Ensure the frame and TuriTap are plumb and level before anchoring.

Figure 12: Example free-standing TuriTap mounted to custom frame with concrete footing

4. For installation at the inlet of water storage tanks, you should consider the best location to mount a frame based on the dimensions of your tank and ease of access.
    a. A similarly dimensioned frame can be used, however, you may want to change the distance between frame legs to allow it to be mounted to a tank. To mount to a tank, holes can be drilled into the tank and the frame can be mounted using standard 8 mm bolts, washers, and nuts (see Figure 7).

2.2. Installing Chlorine Refill Tank, Float Tank, and Brackets

While the Turitap will be supplied pre-assembled, additional understanding of the internal parts can help with servicing and maintenance which ensures longevity and reliability of the doser.

1. Place the empty chlorine refill tank on top of the bracket and place it inside the enclosure. Screw the chlorine refill tank bracket in slightly loose and place (see Figure 14)
2. Slide the chlorine refill tank up until it cannot go higher and tighten the screw.
3. Install the second screw for the chlorine refill tank bracket to secure the bracket and chlorine refill tank.
4. Install the float tank and leave the float tank bracket screw slightly loose. Slide the float tank up/down and tighten the screw. The height of the float tank will need to be later adjusted so that the chlorine level inside of it aligns with the inlet of the Venturi pipe component (see Section 2.7).
5. After the height of the float tank is aligned with the Venturi pipe component, tighten the bracket screw to secure the float tank position.

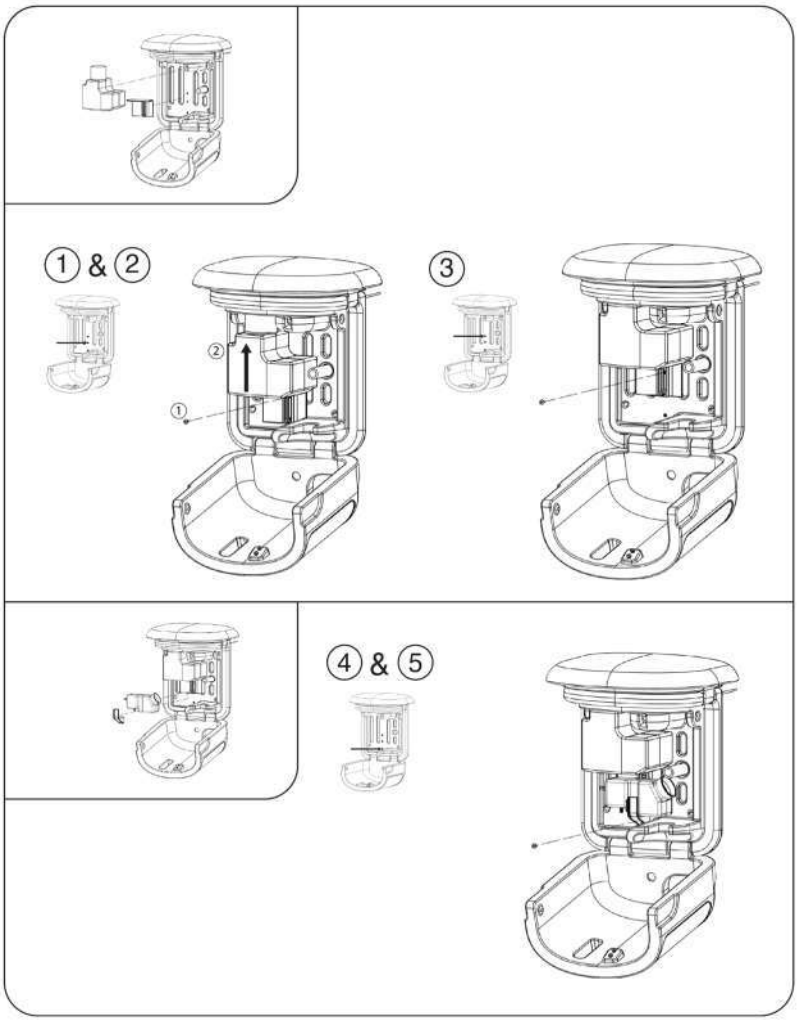

Figure 13: Chlorine refill tank, float tank, and bracket position

2.3. Attaching chlorine refill tubing

1. Place the tube clamp on the chlorine refill tube (see Figure 14).
2. Attach the chlorine refill tube from the chlorine refill tank to the float tank. Connect the chlorine refill tube to the barb outlet on the chlorine refill tank. Then, connect the other end of the refill tube to the barbed inlet of the float tank.
3. Ensure the chlorine refill tube does not kink in any way to prevent flow between the refill tank and float tank. Adjust the position of the tube clamp if needed.

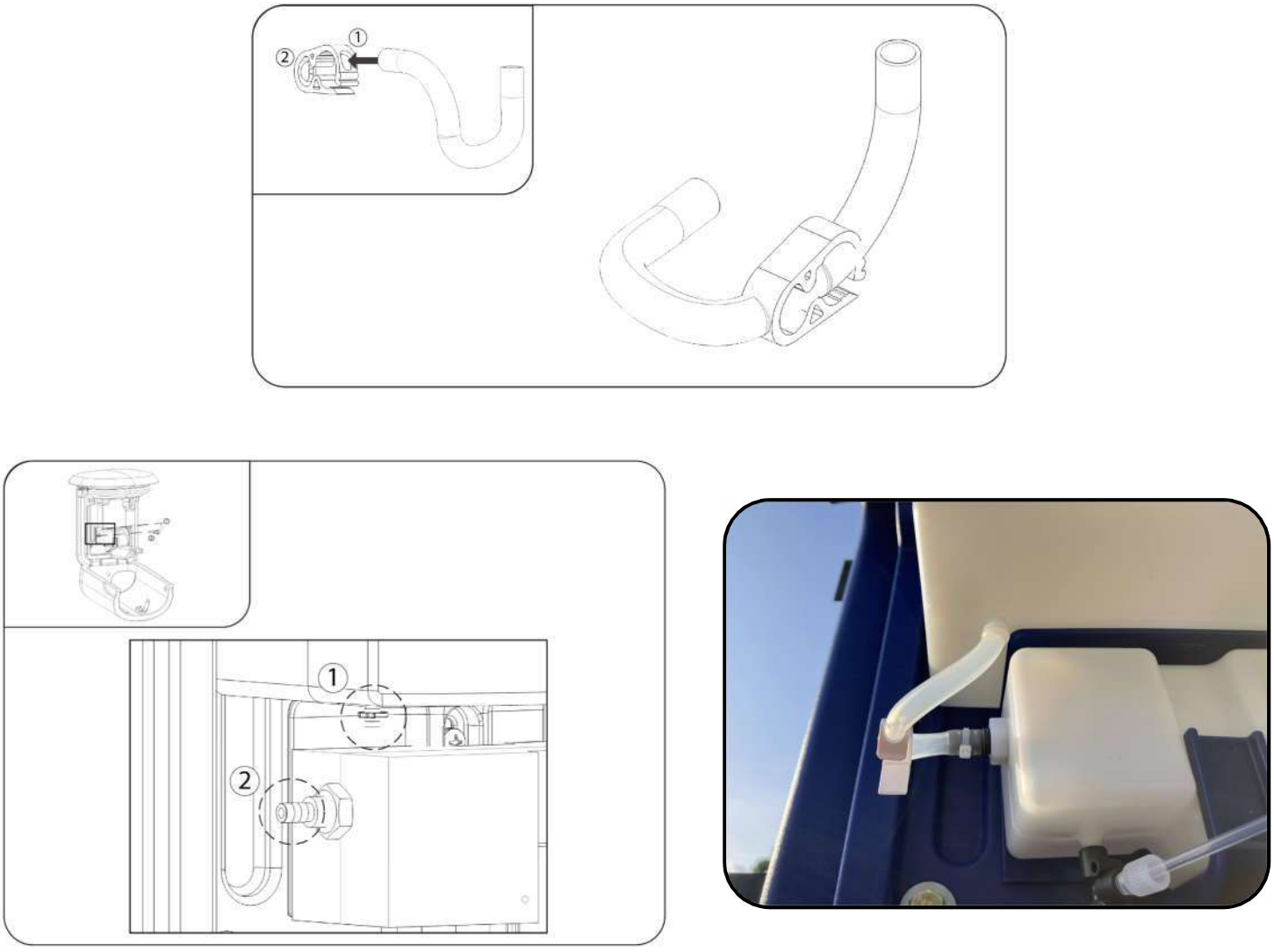

Figure 14: Chlorine refill tube position

2.4. Attaching the Needle Valve

1. Confirm there is a rubber o-ring in the top threads of the needle valve. This o-ring is compressed to prevent leaking from the float tank. Screw on the needle valve to the bottom of the float tank until it cannot be tightened any more. Do not overtighten the needle valve beyond this point. Overtightening the needle valve can result in restricted flow through the dosing tube to the Venturi.

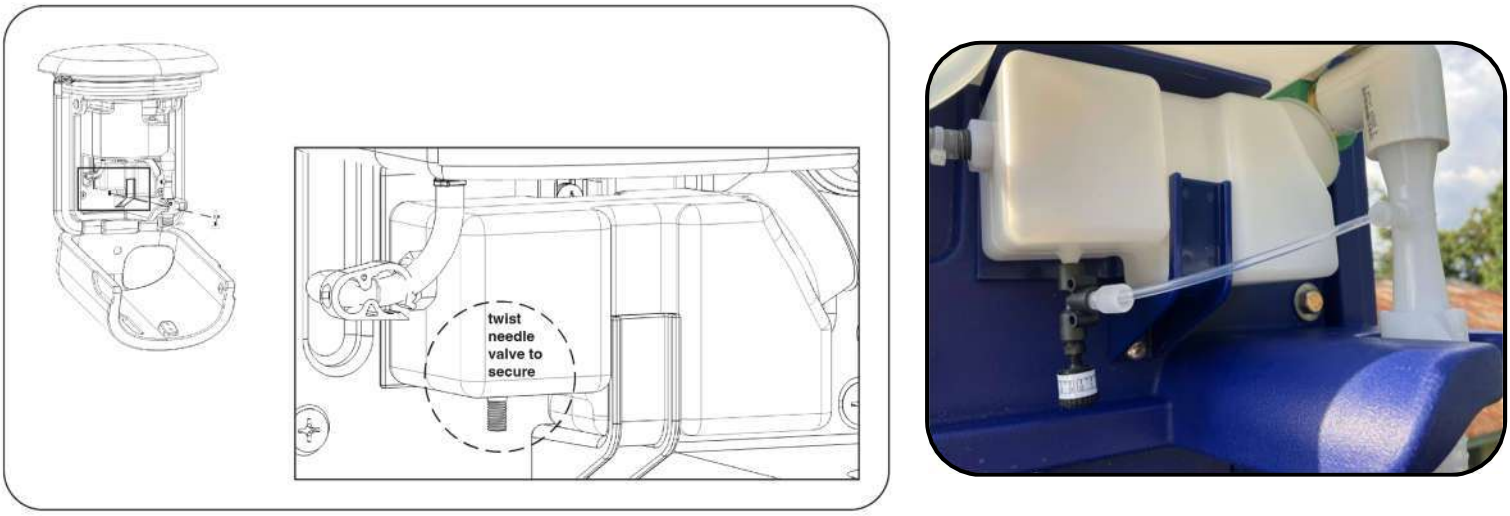

Figure 15: Needle valve installation and position

2.5. Locking the Venturi and Spout in place

The Venturi and PVC pipe components press together. Twist and press the Venturi firmly into the PVC elbow to set them Before assembly, cut the outlet water supply pipe so that the Venturi will be centered above the hole in the bottom right side of the enclosure.

1. Screw together the threaded end of the ¾" 90° PVC elbow (female-threaded adapter) with the threaded end of the ¾" PPR adapter or ¾" PVC adapter (male-threaded adapter).
2. Weld the ¾" PPR adapter onto the outlet water supply pipe, while the 90° PVC is already connected. Other pipe material besides PPR can be used to connect to the outlet water supply pipe. A ¾" PVC adapter is also provided if it is preferred to use PVC pipes instead.
3. Press and twist the Venturi onto the elbow pipe. For a more secure connection, solvent cement can be used to securely bond the Venturi and PVC elbow.
4. Press in the spout onto the bottom of the Venturi. Turn the spout so the pegs on the Venturi lock it in place (see Figure 16).

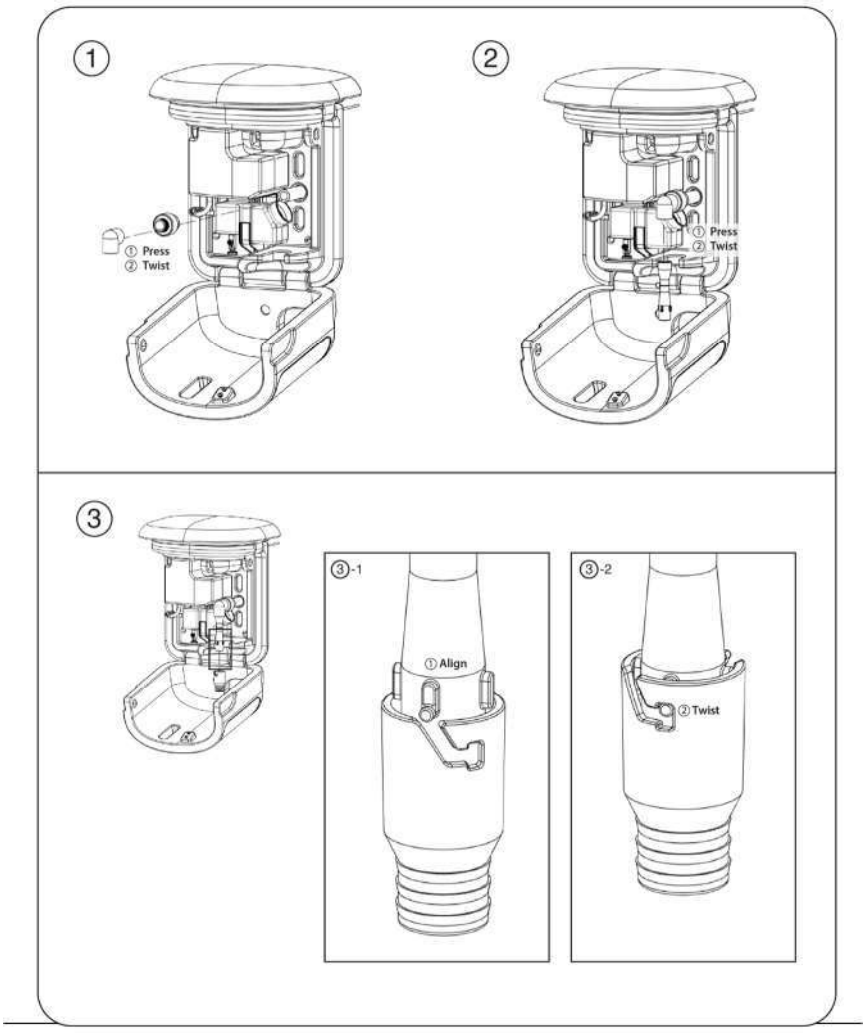

Figure 16: Venturi and spout (bottom right) installation and orientation

2.6. Connecting the chlorine dosing tube

1. Place the compression fitting and ferrule parts on both ends of the chlorine dosing tube. Ensure that the ferrules are flush with the end of the tubing and in the correct orientation. The “cone” side of the ferrule should be facing into the compression fitting/screw.

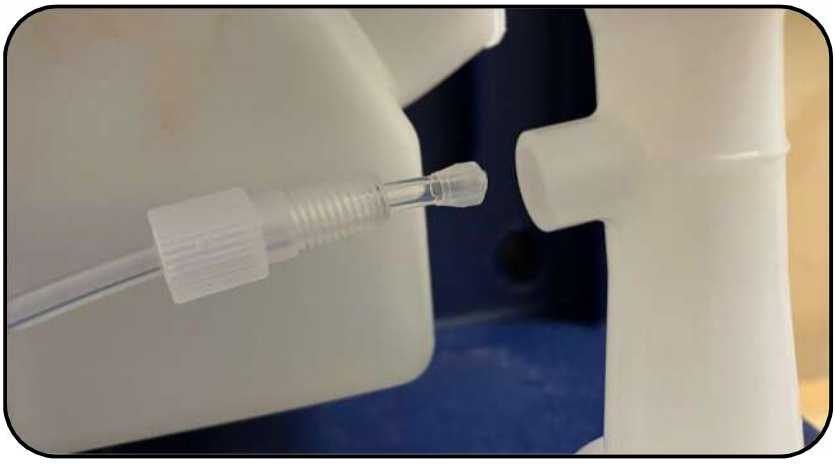

Figure 17: Compression fitting/screw and ferrule orientation on dosing tube

2. Insert the compression fitting/screw into the threads on the needle valve and while pushing gently on the tubing, tighten the compression fitting finger-tight. Overtightening the compression fitting can result in the ferrule becoming deformed and an incomplete seal.
3. Connect the dosing tube from the needle valve to the Venturi by screwing the second compression fitting into the inlet threads on the Venturi.

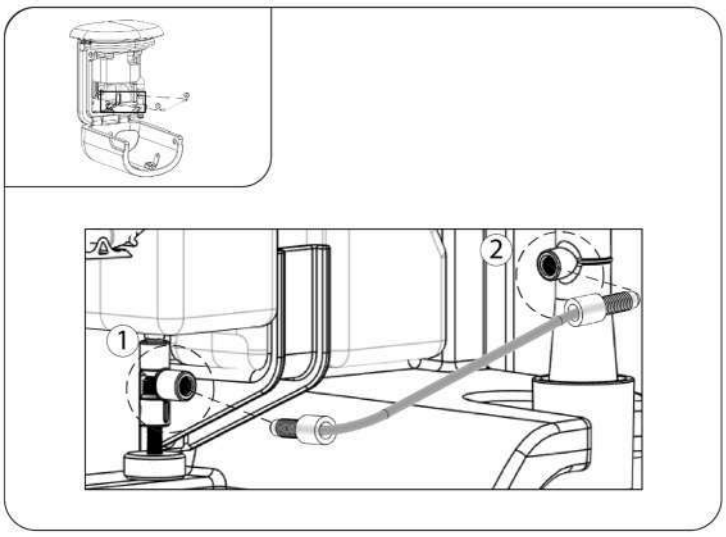

Figure 18: Dosing tube installation

2.7. Aligning the Float Tank

The alignment of the float tank is important for ensuring that the proper amount of chlorine is added.

1. After properly installing the float tank (see instructions above in Section 2.2.), ensure that the chlorine level in the float tank is in line with the inlet (indicated by a marked groove) of the Venturi.
    a. If the components are not aligned, loosen the screw on the float tank bracket to slide the bracket and adjust accordingly.
2. If the float tank is installed significantly higher than the inlet of the Venturi, chlorine will begin to drip into the Venturi and can result in liquid chlorine being wasted or high dosing.

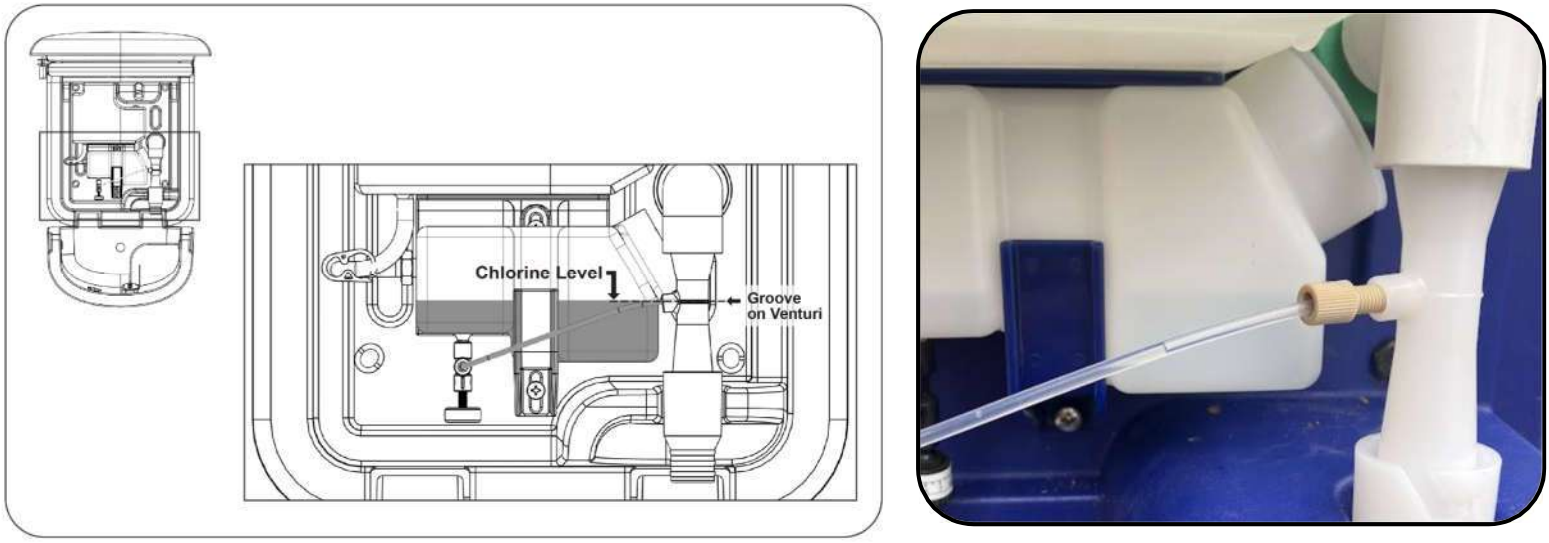

Figure 19: Aligning the float tank level with the Venturi inlet

2.8. Adjusting the Chlorine Dose Using the Needle Valve

The chlorine dose can be adjusted as necessary using the needle valve.

1. Twist the dial on the needle valve and adjust according to the specifications of your free chlorine residual test. Adjusting in the clockwise direction will decrease dosing and adjusting in the anti-clockwise direction will increase dosing.
    a. Turn on the water supply and allow it to flow for 30 seconds, then measure the free chlorine (the dosing requires some volume to stabilize after installation). It is critical to allow water to flow for at least 30 seconds to allow for air to clear the dosing tube line when first operating.
    b. Rotate the needle valve until you can measure detectable levels of free chlorine residual.
2. If the chlorine is outside the desired range, adjust the needle valve in small increments using ~90° rotations, or the equivalent of increasing by 3 number settings on the dial.
3. Repeat the process of adjusting the needle valve, allowing water to flow for 30 seconds, and testing the chlorine concentration until you achieve a chlorine dose in the acceptable range. It is

suggested to set a chlorine concentration within an acceptable range of 0.2-2.0 ppm to avoid taste and odor concerns with the water while maintaining adequate disinfection. Dosing under 1.0 ppm may be desirable to avoid taste complaints in some settings.

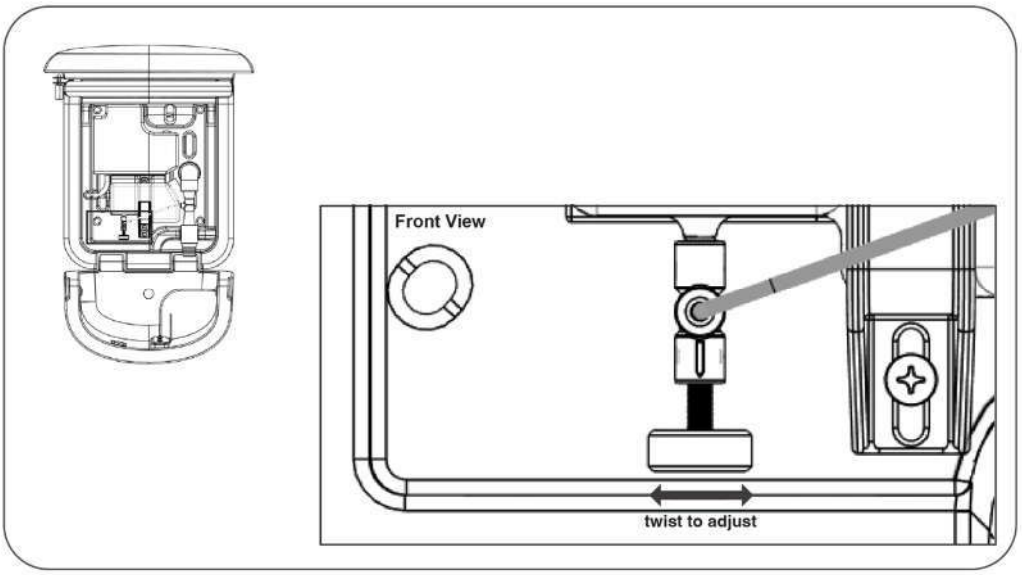

Figure 20: Needle valve adjustment for chlorine dose calibration

3. General Operation

Once the enclosure is mounted to the water source location properly and the Venturi is in place, you can prepare the system for delivering chlorine.

3.1. Refilling the Chlorine Refill Tank

1. Unlock and remove the padlock on the top cover using the provided key. Open the top cover.
2. Fill the chlorine refill tank with at least 500 mL of liquid chlorine. The TuriTap can be calibrated with stock chlorine concentrations ranging from 0.5% to 6.0%. This includes commercially available liquid chlorine like Waterguard, Aquaguard, Dayliff H2O Guard or liquid chlorine generated by an electrochlorinator.
3. Chlorine will begin filling the float tank. The chlorine refill tank can hold up to 2 L of chlorine solution.
4. Close and lock the top cover.
5. Once the float tank has stopped filling (may take approximately 5 minutes), adjust the float tank height (see Section 2.7.):
    a. Align the float tank so that the chlorine line is aligned to the marked groove on the venturi.
    b. If the components are not aligned, loosen the screw on the float tank bracket to slide the bracket and adjust accordingly.

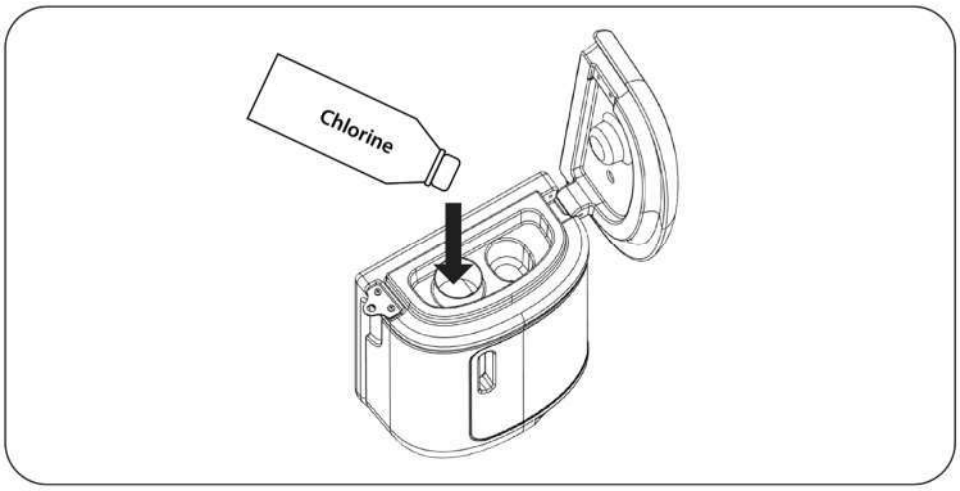

Figure 21: Refilling the chlorine refill tank

3.2. Chlorine Dosing Adjustment

1. Unlock and remove the padlock on the top cover.
2. Unlock and remove the padlock on the front cover.
3. Open the front cover, and ensure the chlorine level in the float tank is aligned with the marked groove on the venturi doser.
4. Twist the cap on the side of the needle valve in 90° increments to the new setting and adjust according to the specifications of your free chlorine residual test. It is suggested to set a chlorine concentration within an acceptable range of 0.2-2.0 ppm to avoid taste and odor concerns with the water while maintaining adequate disinfection (see Section 2.8.).

5. Test the dose and adjust the needle valve again if necessary
6. Close the door and lock the top lids.

3.3. Securing the Enclosure with Padlocks

1. Two padlocks are provided to securely lock the enclosure to prevent chlorine theft or tampering with internal components.
2. Close the front cover. Place a padlock on the front cover lock tab through the opening. Close the lock. The front cover should no longer be able to open.
3. Close the top cover. Place a padlock on the top cover lock tabs by guiding the lock arm through the two lock tab openings. Close the lock. The top cover should no longer be able to open.
4. Maintain a record of key ownership. Alternative locks, including combination locks, can also be purchased separately and used.

4. Maintenance / Troubleshooting

4.1. Chlorine Dosing Check

A monthly chlorine dosing check should be done to ensure the chlorine is dosing as expected. Ensure that the chlorine levels are checked using your preferred free chlorine residual testing method. Additional chlorine testing kits are available from Davis and Shirtliff.

4.2. Low Flow Rates

The TuriTap is only compatible with flow rates between 0.3 -3.6 m^3/hr. If you are concerned the flow rate is too low in your water system, a quick flow rate test can be conducted by using a 1 liter bottle and stopwatch. Measure the amount of time it takes to fill a 1 L bottle. Then, do a calculation to determine the flow rate in cubic meters per hour by calculating:

$$1\ liter\ \div\ (Measured\ Time\ in\ Seconds) \quad 1\ m^3/1000\ liters \quad 3600\ seconds/\ our\ =\ \_\_\ m^3/\ r$$

Do not adjust the needle valve if the flow rate is very low (< 0.3 m^3/hr). This means the flow rate is currently too low for dosing to occur. Additional changes to your water system may be required to increase the flow rate to a level that is effective for chlorine dosing to occur. Technicians from Davis and Shirtliff are available to offer technical assistance should they be required.

4.3. Device Not in Use or Chlorine Tank Empty

If the device has not been in use for a few weeks and/or the chlorine tank is empty, you will need to wash the interior components of the device and add new chlorine into the chlorine refill tank. It is recommended to replace outdated chlorine solution if it has been sitting for more than 1 month to ensure it can maintain adequate disinfection strength.

1. Remove the chlorine refill tank from the enclosure by unscrewing the chlorine refill bracket and then take out the chlorine refill tank.
2. Remove the float tank from the enclosure by unscrewing the float tank bracket and then take out the float tank

3. Drain the existing old chlorine solution by tilting the tanks.
    a. Dilute the old chlorine solution in a 1:10 dilution and dispose of it down a typical drain. Rinse the drain sufficiently after disposing of the chlorine solution.
4. Install the chlorine refill tank and float tank back into place (see Section 2.2.).
5. Refill the chlorine refill tank with fresh chlorine solution (see Section 3.1.).

4.4. Connecting External Pipes or Tubes to the Venturi.

1. No tubing or pipes can be directly attached to the Venturi outlet (instead of to the spout piece). Attaching any pipe or tubing directly to the Venturi outlet pipe will negatively affect chlorine dosing.
2. If a pipe or tube is required to route water from the TuriTap, only attach it to the spout piece when it is attached to the Venturi outlet. This pipe or tube should be less than 1 meter in length to ensure water does not back up into the Venturi and to prevent strain on the parts by the weight of it.

4.5. No Liquid Chlorine Flowing Through Needle Valve

1. If no chlorine is flowing through the needle valve, it is likely due to overtightening the needle valve on the float tank thread post. Tightening the needle valve too far on the thread post can cause overcompression of the o-ring and seal off the needle valve.
2. To troubleshoot, open the needle valve by several rotations by turning the dial counterclockwise. If no liquid chlorine begins dripping out, this could mean the needle valve is overtightened.
3. With the needle valve dial opened, slowly turn the entire needle valve body counterclockwise on the thread post. Continue to loosen the needle valve on the thread post until you can begin to see liquid chlorine drip from it. After loosening, ensure there is no leaking between the needle valve and thread post.

4.6. Air Bubble Trapped in Dosing Tube Line

1. Air can occasionally be trapped in the dosing tube, and the pressure of the Venturi is not enough to clear it. If no chlorine is able to flow to the Venturi, this may be an issue to look for.
2. To clear the bubble, remove the dosing tube line from the Venturi.
3. Lower the outlet of the dosing tube line and see if the bubble will clear by itself from the pressure of the float tank above it.
4. If it does not clear by itself, tap the dosing tube line to dislodge the bubble. You may also want to consider disconnecting the dosing tube line from the needle valve and allowing it to drain before re-attaching to the needle valve and Venturi.
5. Always check that the TuriTap is dosing after clearing any air bubbles and re-attaching the dosing tube line.

4.7. Scaling or Salt Buildup in Tubing or Venturi

1. Source water with high metal content, like iron, or hardness, like calcium, can result in scaling or salt buildup along key chlorine flow pathways like the dosing tube or Venturi that can result in no dosing.
2. If you can visibly see scaling or salt formation, consider performing an acid wash to address it.
3. Procure standard white vinegar (5-30% acetic acid).

4. Disconnect the dosing tube and rinse it with white vinegar 3 times for about 10 seconds each time. Rinse the dosing tube with clean water. Re-attach the dosing tube after coming water can flow through it effectively.
5. Disconnect the Venturi and rinse it with white vinegar 3 times for about 10 seconds. Visibly inspect the inlet hole on the Venturi for any blocks in flow. Rinse the Venturi with clean water.

Figure 22: Example of scaling formation in Venturi

4.8. Preventing Rusting Padlocks

1. If chlorine is spilled on the enclosure padlocks when refilling the TuriTap, the padlock can rust and may break or become difficult to open.
2. Chlorine refills should be performed carefully to prevent chlorine splashing on the enclosure padlocks.
3. If chlorine is spilled onto a padlock, remove the padlock and rinse thoroughly with water for 30 seconds. Dry the padlock before returning it to the enclosure to prevent further rusting.

4.9. Cleaning Tanks and the Needle Valve to Prevent Clogging

After several months of use, particles may be observed in the chlorine refill tank or float tank. Over time, these particles could clog the needle valve, and the TuriTap may stop dosing due to the blockage. Proactive monitoring and cleaning ensures more consistent chlorine dosing.

1. First, drain existing liquid chlorine from the refill tank and float tank.
    a. Disconnect the refill tubing from the float tank and direct the liquid chlorine into a secondary container.
    b. Next, remove the float tank and bracket from the enclosure using a screwdriver. Remove the float tank cap. Pour the liquid chlorine from the float tank into the same secondary container.
    c. Remove the empty chlorine refill tank from the enclosure using a screwdriver to loosen the bracket.
2. Next, remove the needle valve from the float tank. Turn the entire needle valve body anti-clockwise until it is separated from the float tank threads.
3. Thoroughly rinse the refill tank, float tank, and needle valve with fresh water.
    a. If you suspect there is build up of salt precipitates in the system which cannot be removed by flushing with water, you can also rinse with a weak acid solution (e.g. white household vinegar, 5% concentration).

4. Continue rinsing the refill tank, float tank, and needle valve until particles are no longer visible (~1-5 minutes).
5. Once the tanks are cleaned, they can be replaced in their original positions.
    a. Place the refill tank and bracket into position. Fasten the bracket in place using a screwdriver.
    b. Place the float tank and bracket into position. Fasten the bracket in place using a screwdriver.
    c. Reconnect the chlorine refill tubing between the refill tank and float tank.
6. Replace the needle valve into its original position. Use caution to not change the dose setting by turning the needle dial.
7. After all parts are cleaned and reconnected, re-calibrate the chlorine dose. Test the water provided from the TuriTap and adjust the needle valve dial as needed until the desired dose is achieved.
8. Repeat this cleaning procedure as needed. It is recommended to clean TuriTaps at least every 6 months to ensure consistent dosing.

5. Customer Service - Contact Information

In case this device malfunctions or you have any concerns, please contact Davis & Shirtliff for product related information.

If you need technical assistance for TuriTap installations, operation, or maintenance, please contact Mangrove Water for opportunities for tailored, context-specific support over email at turitap@mangrovewater.org or using the link below:

www.mangrovewater.org/about/contact