



User's Guide

About Us

Meridian Design, Incorporated, was founded in 1986 as an engineering company specializing in turnkey embedded control solutions. Meridian Design has developed products in fields as diverse as fiberoptic transceiver modules, LED flashlights, kitchen composters, laboratory test equipment, shape memory muscle actuators, avionics, microscopy, medical centrifuges, model train electronics, and pulse detonation wave engine controllers.

The AquaStar™ UV Portable Water Treatment System is the first directly marketed product offered by Meridian Design. A low-cost solar-powered version of the AquaStar *Plus!*™ is also being developed for use in impoverished areas of the world where water-borne illness ends the lives of over two million people each year.

For more information about us, our products, or the latest [Frequently Asked Questions](#) (FAQ) and [Rarely Asked Questions](#) (RAQ),

Visit our website:

www.uvaquastar.com

Write us:

shop@uvaquastar.com

Meridian Design, Incorporated
13114 E. Galveston St
Gilbert, AZ 85233

Or Call:

(760) 494-0696, 9 am - 5 pm, Pacific Time

Meridian Design, Incorporated
EPA Est. 82431-CO-001

Limited Two Year Warranty / Repair information

Your AquaStar *Plus!*™ UV Portable Water Treatment System (the “Product”) is warranted by Meridian Design, Incorporated to be free from defect in materials or workmanship for a period of two years from the date of purchase. Meridian Design, Incorporated will either repair or replace (at our option) free of charge, any parts necessary to correct defects in materials or workmanship. Should repair be needed within the warranty period, ship the Product prepaid, insured, and attached to a 1L bottle, together with \$10 U.S. for return shipping and handling, and a copy of your original sales receipt, to:

Meridian Design, Incorporated
ATTN: Service Dept.
13114 E. Galveston St
Gilbert, AZ 85233

(For those outside the U.S., please contact us for international shipping charges).

Be sure to include your name, address and phone number with your AquaStar *Plus!*™. This warranty excludes normal wear and tear, tube glass breakage, and improper use. In no event shall Meridian Design, Incorporated be liable, or in any way responsible, for any damages or defects in the Product caused by third-party repairs or modifications.

NO-HASSLE LIFETIME REPLACEMENT POLICY

Accidents happen. Rather than throw away your damaged AquaStar *Plus!*™, we offer a simple lifetime replacement policy. Send us your broken AquaStar *Plus!*™, together with \$30 U.S to cover our repair costs and return shipping, and we'll send you a new or rebuilt unit in exchange. (Note: The repair and shipping fee is valid through 2008, and may be adjusted annually for inflation. In any case, we'll always make sure you have a working AquaStar *Plus!*™ for less than half the cost of a new replacement unit.)

AquaStar *Plus!* Specifications

Weight

- Loaded (as shipped, with batteries and bottle attached): 8.5 ounces (240 grams)

Dimensions

- Control Head (external): 0.75" h x 3.2" w (19 mm x 81 mm)
- Control Head + Tube: 7.75" long (19.6 cm)
- Displacement Volume (in full bottle): 2.6 ounces (78 mL)

Components

- Batteries: 2 x Type 123 (DL123A, CR123A, EL123A, PL123A or similar), 3Volt Photo Battery. These batteries are available wherever film is sold, and cost as little as \$1.00 per battery online (or in stores for a few dollars each). Life expectancy = 60 cycles (60 liters, or 16 gallons, of water)
- UV-C Tube: Philips TUV4T5 Germicidal 4W UV-C (254 nm) Sterilamp®, hot-cathode, low-voltage. Rated useful life (to 85% efficiency) = 6,000 hours. Expected life as used in AquaStar *Plus!* (driven at 5W, producing 0.8W UV-C at 20 ° C) = 2,000 hours
- Bottle: Polycarbonate plastic (equivalent to LEXAN® brand), 32 ounce (1L) wide-mouth
- White LED: 1/4W high efficiency solid state lamp, 12 Lumens out

Dosage and Efficacy

- Dosage Time: 80 seconds per liter (1 cycle). Below 40°F (5°C), dosage time should be doubled (2 cycles per liter)
- UV-C light is highly effective in killing pathogens. While filters tend to miss the very small viruses, some pathogens, such as Cryptosporidium, are resistant to chemicals because of their tough spore shell.
- When water quality is suspect, such as unclear water or when storing water for longer periods of time, combinations of methods work best.
- See www.uvaquastar.com for testing and other efficacy details.

Congratulations!

Thank you for purchasing the AquaStar *Plus!*™ Ultraviolet (UV-C) Portable Water Treatment System by Meridian Design, Incorporated.. Our products are designed with the highest quality components to ensure years of trouble-free service in a variety of environments.

The AquaStar *Plus!* is an ultraviolet water treatment solution appropriate for use in all climates and settings. Campers, hikers, emergency crews – or anyone who values having clean water, will benefit from AquaStar *Plus!*

AquaStar *Plus!* now has a new “Lantern Mode”. It contains a handy separate low power, white LED for lighting.

Using a pair of international standard CR123 batteries, the AquaStar *Plus!* can quickly treat a liter of water in ~80 seconds, and provide over 60 liters, or 16 gallons, of clean water on a single set of batteries. Lightweight, rugged and simple to operate, AquaStar *Plus!* is the ideal water solution for everyone's survival kit.

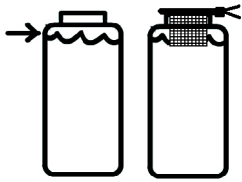
Before using your AquaStar *Plus!* for the first time, we recommend reading the next section of this manual, [Using the AquaStar *Plus!*™](#), to familiarize yourself with the unit.

- *UV-C light can cause irritation to the eyes and skin if exposed for an extended period (over 6 minutes at 1ft distance).* The UV-C light is absorbed by the plastic bottle and is therefore entirely safe when operated as intended. If the light is ever turned on outside of the bottle, the user should simply turn it off by pressing the button again.
- *Keep away from children*
- The AquaStar *Plus!* bottle provides 100% shielding of any UV-C light
- Please wash your AquaStar *Plus!* with a mild detergent and water prior to first use. Clean it and store it in a dry environment when not in use.

Thanks!

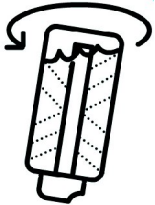
-- Team AquaStar

Using the AquaStar Plus!™

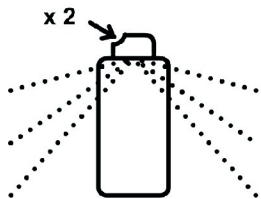
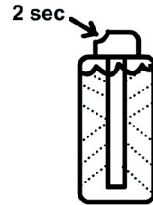


1. Fill the bottle with water to between 300ml and 1L, through a pre-filter if desired or needed, then place the cap on the bottle. The mesh filter provided can remove unpleasant debris but is not intended to filter water. If the water is too silty, the UV-C will penetrate the water less. In this case we recommend filtering the water until it is clear, agitating the water so that more of it comes into closer contact with the lamp, and running the water through more than one cycle to assure complete disinfection.

2. To start cleaning cycle, press and hold the button for about two seconds and release. The tube will light and glow blue and the LED in the cap will glow orange while the cleaning cycle runs.



3. Swirl or agitate the bottle during the cleaning cycle to improve the disinfection process (upside down works slightly better). The water directly under the lamp is partially shaded from the cleansing light, so agitating the water somewhat assures a complete treatment.
4. The cleaning cycle will run for about 80 seconds. The blue UV-C lamp will turn off and the green LED in the cap will blink when the disinfection cycle has finished. A red LED indicates an error and the cycle may not have been completed (see "Tips" and "FAQ" for more information)



Lantern Mode

AquaStar Plus! contains a handy, separate, low-power, white LED for lighting.

LED light does not clean water, and is safe to use out of the bottle

The light is self timed and will go dim in 14 minutes, and will go off a minute later. Clicking the button when the light is in dim mode will return it to bright mode for 15 more minutes. Each 15 minute cycle of white LED light uses approximately 1% of the battery capacity.

Frequently Asked Questions (FAQ)

1. How do I replace the batteries?

Loosen the two screws in the cap until the battery compartment lifts away. Insert a fresh pair of batteries, noting the polarity printed on the cap. Replace the cap and tighten the screws until they are snug. Do NOT over tighten; snug is sufficient to seal the battery compartment.

2. Can the AquaStar Plus! cap be used with a different 1L bottle?

Yes. AquaStar Plus! fits most Nalgene®-style wide mouth 1L (or larger) bottles. Use a rigid-style bottle (not a collapsible "canteen") to protect the UV-C tube. Your AquaStar Plus! ships with a high-quality, lightweight, odorless Nalgene®-style polycarbonate bottle. When treating a quantity of water larger than 1L, make sure to dose the water proportionately longer times. i.e. more than 2L but less than 3L gets 3 doses, and so on.

3. Can the AquaStar Plus! use external power sources?

Yes. A drop-in accessory module for your AquaStar Plus! allows the use of an external battery pack, cigarette lighter adapter, solar panel, wall transformer, and more.

4. Can I replace the tube if it breaks?

No. The G4T5 UV tube is not field-replaceable. The AquaStar Plus! has been substantially reinforced with the tube sealed in ABS plastic at both ends to survive carriage outside of its bottle and should withstand all but the most severe abuse. Unless the tube hits a sharp point in a high drop or is sat on, then the unit should not break.

Tips

- The user can abort a cleaning cycle by pressing the button on the cap.
- The top part of the AquaStar Plus! is splash and dunk proof but is not designed for continuous immersion in water. If condensation is noticed inside the circuit compartment, visible from the clear plastic underside, then the unit can be dried out by opening up the battery compartment and leaving the unit in the sun or warm air for a few hours.
- If the LED in the cap blinks or glows red, the cycle was interrupted. This could be due to low batteries, an impact to the bottle, or a loose battery cover. User should re-run cycle.
- When the bright white spot at the top of the tube turns a dimmer orange, the batteries are getting low; you will have about 5 cleaning cycles left at this point. When the batteries are too low for a complete cleaning cycle, the cap will flash red and abort the cycle.
- Just as filters don't like to be frozen, neither does the AquaStar Plus! Below freezing, the batteries cannot supply adequate power to the unit and freezing diminishes their life as well. Consider leaving the unit inside the tent if below-freezing temps are expected.
- The unit should ideally be stored and carried in the vertical position when filled with water. Increasing altitude or temperature can pressurize the water in the bottle causing it to leak around the threads.
- A system reset should never be needed, but if necessary can be achieved. Remove the battery cap, hold the button down for 2 seconds to discharge the control circuit, and then replace the cap. On system reset, the red light in the cap will blink for 5 seconds and then allow normal functioning.
- The threads can be rinsed for added safety by cracking open the cap with the bottle inverted, thus letting some water leak out and wash these untreated threads.
- Don't use water above 120F (40C) in the bottle. It softens the ABS plastic and can cause leaks.