Billi®

Superior Instant Filtered Water

LUXGARDE™
UVC WATER TREATMENT
CERTIFIED PURIFICATION DEVICE

Billi

LUXGARDE™ UVC WATER TREATMENT CERTIFIED PURIFICATION DEVICE

Billi Australia Pty Ltd has been at the forefront of the instant filtered boiling and chilled water systems industry for over 30 years. In that time the Billi name has become synonymous with innovation and quality. Billi products are celebrated for their combination of functionality, performance and contemporary aesthetics.

In recent years, the topic of water hygiene, particularly drinking water hygiene has become a larger priority for commercial Facility Managers, Hospitals, Aged Care facilities and residences alike.

While Billi's water cooled systems provide a large degree of protection simply by circulating water though the system to avoid stagnation, the ultimate protection against possible water borne pathogens is water treatment, by UVC LED purification.

To solve this problem, Billi has launched it's industry leading purification device, Luxgarde™. This UVC LED purification device is non-chemical and has been developed and tested to be effective against pathogens up to **99.999%*** by ensuring reproduction of possible pathogens is stopped in it's tracks.

LUXGARDE™

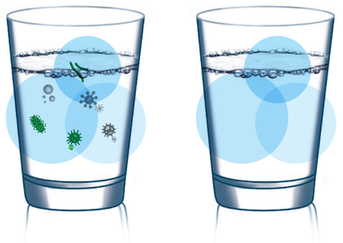
LUXGARDE™ TECHNOLOGY

Regular tap water

Luxgarde purified water

GUARANTEED PROTECTION

- ✓ UV light eliminates up to **99.999%*** of pathogens in drinking water.
- ✓ The UVC device is positioned immediately before the dispenser meaning water is purified on demand, on it's way to the vessel.
- ✓ UVC photons render pathogens incapable of reproduction preventing possible transmission.
- ✓ Drinking water is free from micro-organisms such as coliform, salmonella, legionnaire, aeruginosa, pseudomonas and the hepatitis virus.



May contain:
- Bacteria
- Viruses
- Lead
- Cysts
- Chlorine
- Particulates

Purified up to 99.999% removal of water borne pathogens.

LUXGARDE™ FEATURES

PURIFICATION DEVICE

WQA GOLD SEAL CERTIFIED

WELL CERTIFIED

BIO FILM CONTROL

LEAD SAFE PRODUCT

EASY INSTALLATION

USER FRIENDLY & ERGONOMIC DESIGNED

AUTOMATED ACTIVATION

RETROFITTABLE

Billi

Luxgarde™ UVC Purification Device

LUXGARDE™ UVC PURIFICATION DEVICE

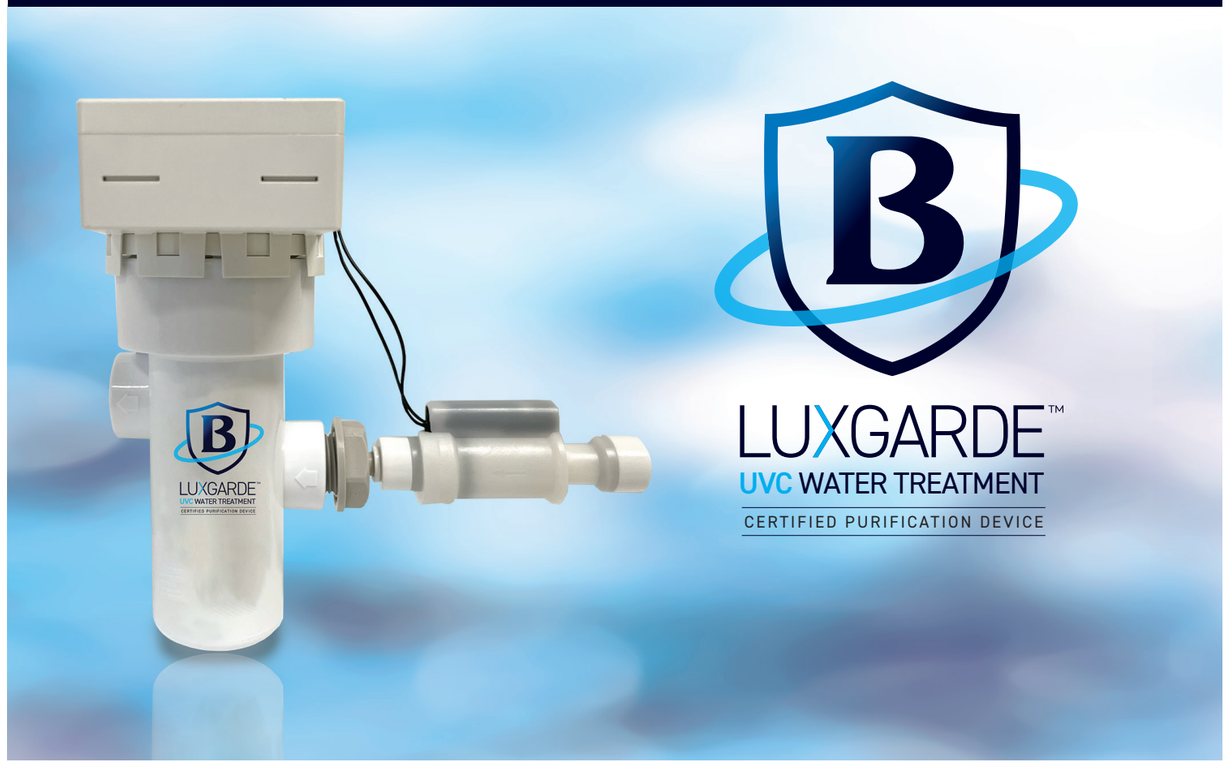
- ✓ Ideal for all Residential, Commercial, Aged Care & Health premises
- ✓ Unique modular connection, easy to install
- ✓ Purifies water by up to **99.999%***, 100% of the time
- ✓ Protection lifespan of up to 3 years
- ✓ Connection kits available for Billi's range of products
- ✓ Complies with and enhances your WELL and ESG credentials
- ✓ Available in 4 variants to satisfy most range requirements
- ✓ Automatic activation triggers at flow rates as low as 0.5l/min.
- ✓ Safe low voltage device with powerful LED technology

LUXGARDE™

“ Luxgarde™ UVC Purification Device purifies up to 99.999%* of your drinking water, 100% of the time ”

*Source: Crystal CIS Lab Testing

Luxgarde™ Case Study



LUXAGRDE PUT TO THE TEST AGAINST E.COLI

On 27 July of 2022, leading independent laboratory GAP EnviroMicrobial Services Ltd (GAP) in Canada tested 3 x Luxgarde™ purification devices, (model code: WR/WS 24V-2B-B1), to measure their effectiveness at eliminating Escherichia coli (E.coli) from drinking water.

Escherichia coli (ATCC 8739) was grown as an overnight culture. with this specific strain routinely used as a challenge microorganism in disinfection efficacy testing. The log inactivation for each test condition was calculated by comparing the E. coli concentration upstream of the test units to the concentration on the effluent side.

LUXGARDE TESTING PROVEN CONCULSIVE

Escherichia coli (ATCC 8739) was grown as an overnight culture with agitation at 35°C ± 0.5°C and was added to the batch tank at a concentration of approximately 1.0 x 106 CFU/ml.

The test units were LED based; therefore, no lamp warm-up was required, and therefore lamp age was not verified. The UV LED's in the test units were powered at 24 volts using a provided power supply and were triggered to turn on using a 3.3 volt current from a separate power supply. As lamp warmup was not required, flow to the test units was initiated at the same time as the test units were powered on.

Tests were completed at a UVT of ~96% at a variety of flow rates. Flow was allowed to continue for 20 seconds prior to collection of effluent samples; subsequent samples were collected at 20 second intervals until 3 samples were collected.

After all effluent samples were collected the test units were powered off but flow was maintained and allowed to run for a further 20 seconds prior to collection of the untreated, or influent, samples, again at 20 second intervals. Three influent (untreated) and three effluent sample were collected per test point.

The log reduction each test point was determined by comparing the geometric mean of the influent concentrations to the geometric mean of the effluent concentrations. Water temperature throughout testing was between 21.8°C and 22.4°C

Table 1 following summarises the criteria and highlights of the case study test results. A full set of results can be found on Billi Australia's website.

Luxgarde™ Case Study

Test ID	Voltage	UVT (% per cm)	Flow rate (L/min) (CFU per ml)	Avg influent	Avg log	Avg effluent (CFU per ml)	Avg log	Avg log reduction	Efficacy (%)
1, 5, 9	24.01	96	1	74000000	7.85	36	1.65	6.2	99.9999
2, 6, 10	24.01	96	2	50000000	7.86	22	1.73	6.12	99.9999
3, 7, 11	24.01	96	3	74333333	7.86	165	2.18	5.67	99.999

Table 1: Summary of test results, conducted on all test apparatus.

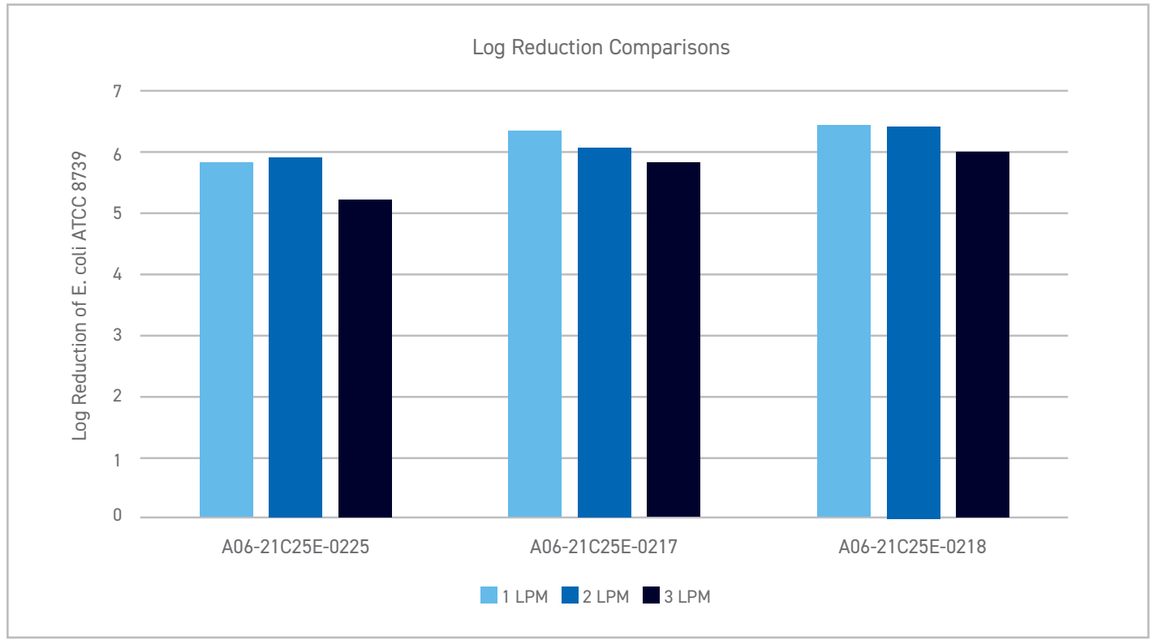


Figure 1: Log reductions measured for the three Luxgarde™ reactors tested at a UVT of 96.0% ± 0.4% and a temperature of 20.0°C ± 2.4°C using dechlorinated tap water (City of London, Ontario, Canada).

ABOUT GAP ENVIROMICROBIAL SERVICES LTD

GAP EnviroMicrobial Services Ltd. (GAP) specializes in environmental microbiology laboratory services including testing, analysis, and research in areas of surface water, wastewater treatment, disinfection efficacy, microbial detection and identification. GAP was established in 1996 and has grown since that time in both size and in the variety of services on offer and has continuously provided quality analysis for industries, institutions, engineers, and consultants.

With a focus on quality, GAP maintains a state-of-the-art level 2 microbiology laboratory capable of analysing a wide range of samples associated with environmental systems. Core analysis capabilities include classical microbiological methods as well as and molecular biology techniques with a focus on special projects including disinfection efficacy testing, UV reactor validation support using bacteriophage (MS2, T1UV, and T7) and Bacillus, Legionella monitoring, pathogen detection and third-party witnessing.

GAP are ISO/IEC 17025 certified with accreditation through the Canadian Association of Analytical Laboratories (CALA) for specific parameters that include Bacteriophages in water for UV disinfection validation; F-specific and somatic coliphage, Bacterial Filtration Efficiency (BFE) and culturable Legionella in water. An an ISO/IEC 17025 recognised facility, GAP is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing calibration and inspection reports and as such is therefore endorsed by NATA in Australia.

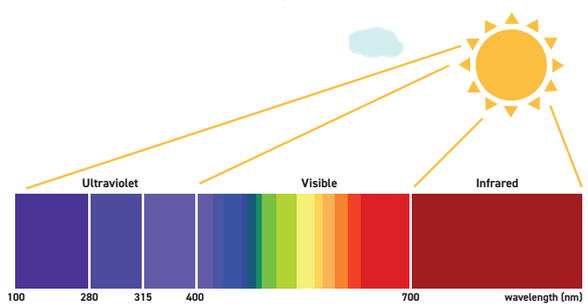
Billi Luxgarde™ UVC Purification Device

WHAT IS UVC

Ultraviolet (UV) light is a non-visible form of electromagnetic radiation that can cause damage to living tissue and is transmitted in the form of particles at different frequencies and wavelengths known as the electromagnetic spectrum. UVC radiation is commonly referred to as short wave UV as it operates within the wavelength of 100nm – 280nm and is recognised as being very useful as a germicidal solution, with the greatest effectiveness between 250nm – 270nm. As possible waterborne pathogens are exposed to UVC via Luxgarde's LED reactor, it is absorbed by the DNA, RNA and proteins of the cell. This absorption disrupts the cell replication process and ruptures the cell wall.

Cells that don't replicate, don't infect.

Electromagnetic Spectrum



DNA of a cell being deconstructed

PRODUCT EFFICACY

✓ 2L/min. pathogen reduction of **99.99%**

✓ 2.5L/min. pathogen reduction of **99.999%**

In terms of infection control, 'Log Reductions' convey how effective a product is at reducing pathogens. The greater the log reduction the more effective the product is at killing bacteria and other pathogens that can cause infections. 'Log' is short for logarithm, a mathematical term for a power to which a number can be raised. A log reduction takes the power in the opposite direction as demonstrated below.

Log Reduction Value (LRV)	Percentage Reduction	Impact on colony forming units (CFU)	
2 log (Log2)	99%	x100	
3 log (Log3)	99.9%	x1,000	
4 log (Log4)	***99.99%***	***x10,000***	→ Typical effectiveness of Luxgarde
5 log (Log5)	***99.999%***	***x100,000***	→ Maximum effectiveness of Luxgarde

HYGIENE PROTECTION PROTOCOL

Luxgarde™ is fitted with an additional layer of hygiene protection for those times that the system may be manually automatically set to enter one of Billi's energy saving modes, or extended periods of non-use during normal operation. The device has an automatically engaged protection protocol that switches the device to ***DISINFECTION ON*** for a period of 2 minutes to ensure any potential accumulation of biofilm within the device.

The Hygiene Protection protocol is activated after a period of 12 hours of continuous non-use. This protocol is activated after a period of 12 hours of continuous non-use.

SERVICE & MAINTENANCE

The Luxgarde™ UVC Purification Device has no serviceable parts. It should not be modified or disassembled in any way. Doing so may result in damage, hazardous operation and Ultraviolet (UVC) light exposure hazards.

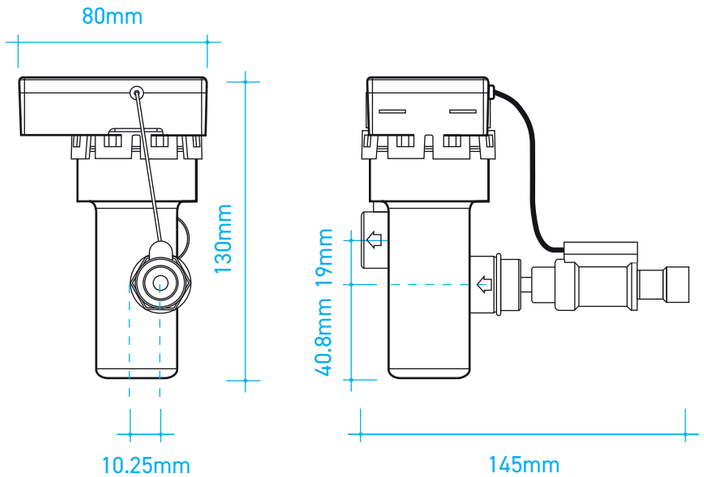
LED UVC Modules are consumable items and should be replaced after 450 hours of LED activation operation, or a maximum of 3 years, whichever comes first. Failure to replace device within recommended time frame will result in diminished performance and potentially void your warranty.

Manufacturers guidelines must be observed at all times to ensure safe and effective operation of this product.

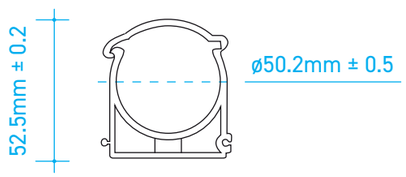
Billi Luxgarde™ UVC Purification Device

PRODUCT DIMENSIONS

UVC Purification Device

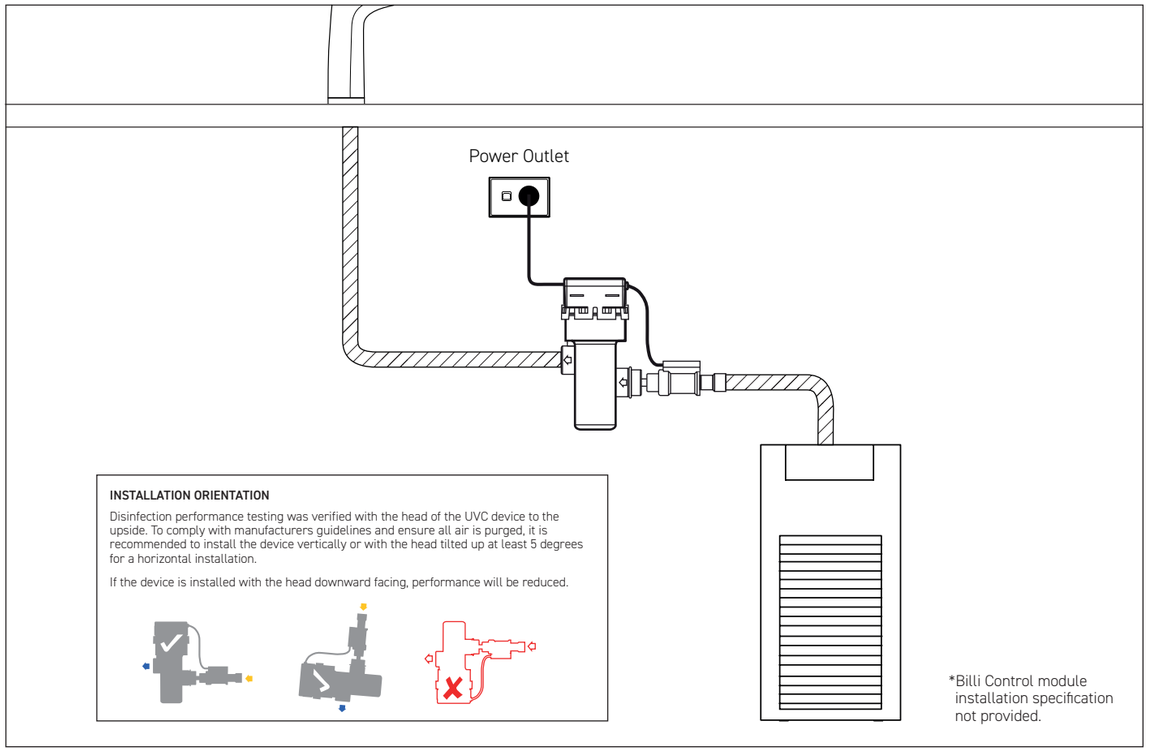


Mounting Clip



*All dimensions have a tolerance of ± 0.002 in | 0.05 mm.

INSTALLATION GUIDE



Billi Luxgarde™ UVC Purification Device

APPLICABLE MODELS

Water Type	Model Range	Luxgarde Code
BOILING CHILLED	Quadra Compact	994101
	Quadra	994101
	Quadra Plus	994101
BOILING CHILLED SPARKLING	Eco Sparkling	994102
	B5000 Sparkling	994102
	Quadra Sparkling	994102
	Quadra Sparkling Plus	994102
CHILLED	Alpine	994104
	Home C	994104
	Home FT	994104
CHILLED STILL	Alpine 125	994106
BOILING STILL	Eco	994107
	Home BC	994107
CHILLED SPARKLING	Alpine Sparkling	994108
	Home CS	994108
BOILING CHILLED SPARKLING	OmniOne Pro	994109
	OmniOne Plus	994109
	Home BCS	994109
BOILING STILL	Sahara	994111
	Sahara Plus	994111
	Home BA	994111

PRODUCT COMPATIBILITY

Luxgarde™ has been designed in line with all connections within Billi systems, but it can also be connected to other compliant drinking water systems. Please review the installation specification to verify product compatibility.

Billi®

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