

Installation and operating instructions

For models IP15N, IP30N, IP55N

Ultra Violet Disinfection

Contents



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- Installing your UV
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Installation and operating instructions

Basic principles of UV disinfection

INTRODUCTION

Thank you for purchasing your Liff UV Disinfection unit. The following pages contain information that will help you install, operate and maintain this equipment. Before we discuss the installation procedure, we believe it will be beneficial for you to learn a little about the process of UV Disinfection.

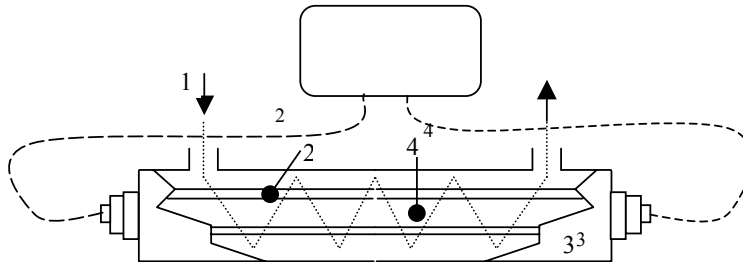
HOW UV DISINFECTION WORKS.

UV (Ultra Violet) Disinfection of water is achieved by simply exposing the water to UV light of a specific wavelength. This wavelength is known as the Germicidal Wavelength. The output of the UV lamp is concentrated at 254 nanometers, the most effective wavelength for penetrating the outer skin of Bacteria and Virus cells.

Irradiating water in this manner damages the DNA of the cell, preventing it from reproducing. In effect this action destroys any pathogenic properties the cell may possess.

The UV lamp is positioned inside a quartz sleeve which prevents the water that passes through the UV chamber from coming into direct contact with the UV lamp, whilst at the same time allowing the UV light to pass through into the water without interference. The effectiveness of the UV system is determined by the intensity of the UV light and the amount of time the water is exposed to that light. All Liff UV systems are sized to ensure a lamp output and flow rate that provides an output of $30,000\mu\text{Wsec}/\text{cm}^2$.

Most common bacteria and viruses require an average exposure of between $4,000$ and $12,000\mu\text{Wsec}/\text{cm}^2$ to ensure their destruction. Operating at $30,000\mu\text{Wsec}/\text{cm}^2$ ensures the Liff UV system will provide a minimum of two and a half times overkill. This kill rate will increase as the rate of water flow is decreased. The diagram below is a schematic drawing showing how the water passes through the UV chamber.



1. Water enters and flows into the chamber, between the UV body and the quartz sleeve.
2. The quartz sleeve, positioned inside the UV chamber, prevents the UV bulb from coming into direct contact with water. A rubber 'o' ring washer, Teflon washer and plastic nut hold the quartz sleeve in place.
3. The UV body.
4. The UV lamp sits inside the quartz sleeve and is held in place by lamp connectors.

Electrical Requirements

- This UV needs to be connected to a 3 amp fused, 230v (50hz) supply. The spur must incorporate a switch to enable maintenance or repair of the equipment.
- The plug must be connected to a supply having a means of disconnection, which must incorporate a gap of at least 3mm.

When the unit is switched on a means of isolation (double pole fused switched) must be accessible

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Installing your UV

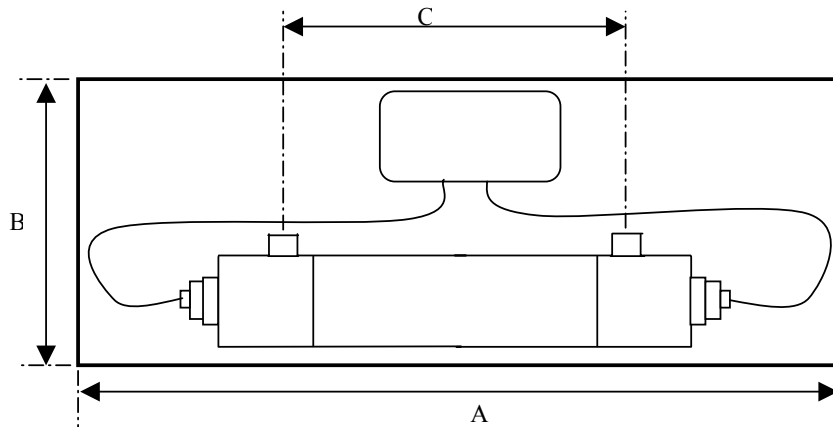
INTRODUCTION

Your UV system is pre-mounted on a backing board for ease of installation. We strongly recommend that the water feeding the UV be pre-treated by passing it through a filter (Liff filters are available as an optional extra). This filter will remove sediment from the water and will prevent an effect called shadowing, where contaminants can hide behind larger particles as they pass through the UV chamber.

To help monitor the performance of the UV system we recommend that water sample points be installed either side of the unit. Simply comparing the quality of water at these points will provide an easy 'before and after' method for testing the effectiveness of the UV system. The water sample point situated before the inlet to the UV system will also serve as a drain point for flushing through newly installed filters (if fitted). In addition we would also recommend that isolating valves be fitted either side of the UV system to facilitate servicing at a later date.

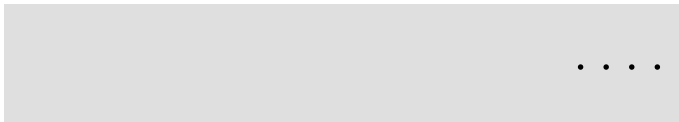
To ensure adequate contact time between the water and the UV lamp, the flow through the UV system is governed by a flow restrictor (see chart below for details). If you are installing a pre-filter, care should be taken to ensure you have adequate pressure to allow the filter to perform as specified. The optimum incoming pressure to the filter is in the region of 2 to 3 BAR. **The maximum pressure must not exceed 5 BAR.** If you are unsure of your water pressure, ask your water company (or plumber if you have a private water supply) for details.

Water passing through the UV will be disinfected, but there is no residual effect, so care has to be taken to ensure contamination does not occur downstream of the UV. For this reason it is recommended that the UV be installed as close to the point of use as is practical. When positioning your UV unit, you should allow sufficient room at one end of the UV body to remove and replace the quartz sleeve and UV lamp. The lamp will need replacing every 9 to 12 months.



Model	Flow L/sec	Flow GPM	Connection	Lamp (watts)	Mat'l	A (mm)	B (mm)	C (mm)	Filter supplied
IP15N	0.13	1.8	1" BSP F	15	PVC	460	330	295	yes
IP30N	0.32	4.2	1" BSP F	30	PVC	1016	460	746	yes
IP55N	0.9	12	1" BSP F	55	PVC	1016	460	746	yes

The above units are supplied with a mounting board, power pack, UV lamp, quartz sleeve, end fittings and 1 metre of 3 core cable for connection to a suitable electrical supply (240v, 3 amp fuse).



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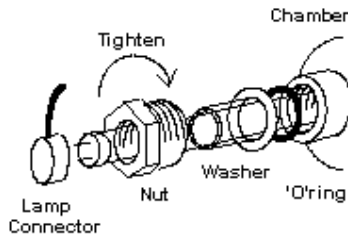
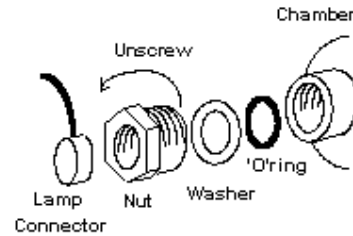
Installation and operating instructions

Installing your UV (cont)

ASSEMBLY OF QUARTZ SLEEVE AND UV LAMP.

The instructions below describe the procedure for the initial installation of the quartz sleeve and UV lamp.

1. Make sure the main plug from the control panel IS NOT connected to the mains supply. The power should not be switched on until the latter stages of the installation.
2. Remove the grey lamp connectors from each end of the UV chamber.
3. Unscrew the black PVC retaining nuts to expose the Teflon washers and 'O' ring seals. Remove both of these items.
4. Check the quartz sleeve for any signs of damage before continuing with installation (see terms of the warranty at the back of this manual for quartz sleeve warranty details). If the quartz sleeve is in good condition, insert the quartz sleeve into one end of the body and carefully guide it through the chamber until it sits centrally. Make sure you can feel an equal length at each end. Please note; the quartz sleeve is very fragile and a great deal of care should be taken to ensure that it isn't damaged during this procedure.
5. Gently slide the UV lamp into the quartz sleeve. Avoid touching the UV lamp for longer periods as is absolutely necessary. The aim is to avoid leaving finger marks on the glass.
6. Lubricate one of the 'O' ring washer with a small amount of washing up liquid or similar lubricant and slide it onto one end of the quartz sleeve. Repeat this procedure on the other end of the quartz sleeve. Position the 'O' rings so they sit in the chamfer recess at each end of the UV chamber.
7. Slide the Teflon washers over the quartz sleeve until they touch the 'O' rings. Make sure the quartz sleeve sits centrally in the UV chamber.



8. Slide the nuts over each end of the quartz sleeve and tighten until they touch the washers. Tighten each, alternately until they are hand tight. Do not over-tighten as this may cause damage to the quartz sleeve.
 9. Attach the lamp connectors to the two pins at each end of the UV lamp. Make sure the UV lamp sits centrally in the quartz sleeve.
 10. Allow the UV chamber to fill with water, check for leaks and gently tighten the end nuts if required. Ensure all water connections to the unit remain dry.
 11. Connect the electrical supply and allow the UV lamp to warm up for 10 minutes before allowing water to pass at full flow.
- Check for water leaks.



Installation and operating instructions

General maintenance

INTRODUCTION

There are three components that need to be checked periodically; the UV lamp, pre-filter (if fitted) and the quartz sleeve.

UV Lamp

Most common bacteria and viruses require an average exposure of between 4,000 and 12,000 $\mu\text{Wsec}/\text{cm}^2$ to ensure their destruction. Operating at 30,000 $\mu\text{Wsec}/\text{cm}^2$ ensures the Liff UV will provide a minimum of two and a half times overkill. The kill rate is determined by the amount of time water is exposed to the UV light and the intensity of that light. The intensity of the UV lamp reduces with age. For this reason we recommend that the UV lamp be changed at least every 12 months. It should be noted that frequently switching the UV system on and off, would rapidly diminish the life of the UV lamp. Used lamps should not be broken and should be disposed off thoughtfully.

Pre-filter

The IP range is supplied with a pre-filter as standard. This filter will remove sediment from the water and will prevent an effect called shadowing, where contaminants can hide behind larger particles as they pass through the UV chamber. This filter will need replacing every 3 to 6 months, depending on the quality of incoming water (see instructions that are supplied with filter for information on filter replacement). The pressure drop across the filter can be in the region of 1.5BAR which means it must be installed in a part of the system that is fed by a minimum of 2.5 to 3BAR i.e. mains pressure. NB *The filter should not be installed on the down service from a storage tank where the head of pressure is less than 2BAR (20metres or 70feet)*

Quartz sleeve

The UV lamp is positioned inside a quartz sleeve which prevents the water that passes through the UV chamber from coming into direct contact with the UV lamp, whilst at the same time allowing the UV light to pass through into the water without interference. To ensure full penetration of UV light into the water, the quartz sleeve should be cleaned at a minimum of 6 monthly intervals. It may be advisable to check the quartz sleeve more frequently if there is no pre-filter or in areas where the water is hard. Gloves should be worn when changing the quartz sleeve..

ROUTINE MAINTENANCE

MONTHLY

Visually check the lamp. The end of the lamp / quartz sleeve will glow during normal operation. It is safe to view UV light from the ends in this way, however you should not look directly at the surface of the UV lamp when it is switched on.

3 MONTHLY

If fitted, check and replace pre-filter if necessary. The pre-filter should be changed at least every six months.

6 MONTHLY

Inspect quartz sleeve. Clean if dirty or replace if damaged.

ANNUALLY

Replace UV lamp. Check water samples from pre and post UV water sample points (if installed) to ensure the UV product water is microbiologically safe. Depending on the quality of your incoming water, it may be advisable to check the quality of the product water more frequently than this.

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Installation and operating instructions

General maintenance (cont.)

LAMP REPLACEMENT

Listed below are instructions for replacing the UV lamp.

1. Isolate the electrical supply before removing the connectors from the two pins at either end of the UV lamp.
2. Isolate the water supply to ensure un-treated water does not pass into the system during maintenance.
3. Remove the UV lamp.
4. Remove the lamp connectors from each end of the UV lamp and withdraw the old / damaged UV lamp. Dispose of the UV lamp thoughtfully.
5. Carefully slide the new UV lamp into the quartz sleeve. Keep the UV lamp straight. Avoid touching the glass of the UV lamp. The UV lamp is fragile, so handle with care.
6. Leaving one end of the UV lamp clear of the UV body, push the connector onto the two pins at the end of the UV lamp.
7. Push the connector cable and lamp a few inches into the quartz sleeve until the opposite end is exposed, push the connector onto this exposed part of the UV lamp.
8. Push the connector cable and lamp back into the quartz sleeve until the UV lamp sits centrally.
9. Turn on the electrical supply and ensure the ends glow blue. All the lamp to warm up for 10 minutes before turning on the water and allowing water to flow through the chamber.

QUARTZ SLEEVE REMOVAL AND CLEANING

Listed below are instructions for removing and cleaning the quartz sleeve. Care should be taken to avoid damaging the quartz sleeve, as this component is very fragile.

1. Isolate the water flow and electrical supply before removing the connectors from the two pins at either end of the UV lamp.
2. Having isolated the electrical supply, remove the UV lamp.
3. Allow as much water as possible to drain from the UV chamber before continuing with the next step.
4. Remove the nuts, Teflon washers and 'O' ring seals from each end of the quartz sleeve.
5. Withdraw the quartz sleeve taking care not to allow it to drop into the chamber. Failure to follow this instruction could lead to the ends of the quartz sleeve being damaged.
6. Inspect the quartz sleeve for discoloration and damage. If the quartz sleeve is damaged in any way then it must be replaced. Installing a damaged quartz sleeve can lead to water leakage at a later date.
7. If necessary, wash the quartz sleeve with soapy water. Use a bleach solution to remove heavy stains. Take care not to damage the quartz sleeve during this process.
8. Dry the quartz sleeve thoroughly (inside and out) before re-installation into the UV chamber.
9. Centralise the quartz sleeve in the chamber.
10. Lubricate one of the 'O' ring washer with a small amount of washing up liquid or similar lubricant and slide it onto one end of the quartz sleeve. Repeat this on the other end of the quartz sleeve. Position the 'O' rings so they sit in the chamfer recess at each end of the UV chamber.
11. Slide the Teflon washers over the quartz sleeve until they touch the 'O' rings. Make sure the quartz sleeve sits centrally in the UV chamber.
12. Slide the nuts over each end of the quartz sleeve and tighten until they touch the washers. Tighten each, alternately until they are hand-tight. Do not over-tighten as this may damage the quartz sleeve.
13. Allow the UV chamber to fill with water, check for leaks and gently tighten the end nuts if required. Ensure all water connections to the unit remain dry. Ensure the inside of the quartz sleeve also remains dry.
14. Attach the lamp connectors to the two pins at each end of the UV lamp. Make sure the UV lamp sits centrally in the quartz sleeve.
15. Connect the electrical supply and allow the UV lamp to warm up for 10 minutes before allowing water to pass at full flow.

Check for water leaks.



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Warranty information

Except for the UV lamp and quartz sleeve, all parts of your Liff UV system are covered by a 12-month warranty. The warranty period starts from the date of despatch. This warranty covers workmanship in manufacture only. Under the terms of our warranty, any faulty part should be returned to Liff Industries directly. We reserve the right to replace or repair the part at our discretion.

UV Lamp life

The UV lamp is covered by a 2,000 hour warranty. This warranty does not cover accidental damage to the UV lamp. It should be noted that lamp life will be significantly reduced if the UV lamp is frequently switched on and off. The warranty does not therefore apply to UV systems subject to this type of usage.

Quartz sleeve

The quartz sleeve is very fragile. The warranty applies to shipment only. You should check the quartz sleeve on delivery and report any damage before installation. The warranty does not include damage sustained during quartz sleeve assembly or replacement.

The above warranty excludes labour costs and does not extend to accidental damage, misuse or normal wear and tear. The above terms do not affect your statutory rights.

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Troubleshooting guide

PROBLEM	POSSIBLE CAUSE	ACTION
UV lamp fails to light	No power	Check fuse. Replace or repair. Check electrical supply.
	Starter has failed	Isolate power. Open power pack and replace the starter.
	Connectors not properly pushed home.	Check to ensure the green neon light is illuminated. Isolate power. Check and refit connectors at both ends of the UV lamp.
	Faulty UV lamp	Replace UV lamp.
	Faulty wiring or ballast	Contact Liff Industries.
	Blown fuse	Check your power supply
	Age of UV lamp	Replace UV lamp
UV lamp illuminates, but flickers	Water leakage due to damaged quartz sleeve.	Following the procedure set out in early pages, remove the quartz sleeve. Replace if necessary.
	Faulty or bad contact on starter	Isolate power. Refit or replace the starter
Water leaks from end nuts	End nuts not tightened properly	Gently tighten end nuts
	Damaged 'O' ring	Replace 'O' ring
	Teflon washer damaged or not fitted.	Replace or install as required.
	Quartz sleeve damaged	Remove and check quartz sleeve for chips and cracks. The quartz sleeve is very fragile and the smallest of chips or cracks could lead to a leak. Refit or replace quartz sleeve as necessary.
Water sample fails microbiological test	Problem with test procedure	Ensure all receptacles are properly sterilised before use. Clean sample points thoroughly before taking sample.
	Ingress of contaminated water after UV system. NB UV light does not have a residual effect, therefore your UV system can only be checked by taking a water sample immediately after the outlet to the UV.	Check your water system to ensure contaminated water has not infected the UV disinfected water downstream of your UV system (perhaps through a crack in the pipe-work or as a result of a dead-leg).
	Pipe-work or fittings contaminated down line of UV system. NB See note above.	Using an approved treatment method, chlorinate the system following the manufacturer's instructions.
	Wrong UV lamp size fitted	Check and replace.
	UV lamp connectors are wet	Remove and dry out lamp connectors
	Quartz sleeve is dirty	Remove and check quartz sleeve. Replace or clean as required.
	Lamp not allowed sufficient time to warm up. NB If contaminated water has passed through the system whilst the UV lamp is switched off, or is not properly warm, the system may need to be re-chlorinated before a water test will show an appropriate reading down line of the UV system.	Allow lamp to warm up for 10 mins before passing water through the UV system.

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