



# Installation & User Manual

## VGE Pro MultiMax



## Content

1	Introduction .....	6
1.1	Company introduction .....	7
1.2	Our passion.....	8
1.3	Manual is intended for .....	9
1.4	Optical radiation .....	10
1.5	UV lamp types.....	11
1.6	UV disinfection .....	12
1.7	Icons .....	13
2	Safety instructions .....	15
2.1	Intended use .....	15
2.2	Safety instructions .....	15
2.3	Environmental conditions .....	17
2.4	Safety instructions on the UV-system.....	18
2.5	Handling of UV lamps and quartz sleeves .....	19
2.6	Quartz tube breakage.....	20
2.7	Lamp breakage .....	21
2.8	Electrical isolation.....	21
2.9	Electrical grounding.....	21
2.10	Operating conditions .....	22
3	Scope of delivery, transport and storage .....	23
3.1	Scope of delivery.....	23
3.2	Transportation .....	23
3.3	Storage .....	24
3.4	Warranty .....	24
4	The UV system.....	25
4.1	UV applications .....	25
4.2	Product overview.....	26
4.3	UV system composition.....	27
4.4	Irradiation chamber .....	28
4.4.1	Irradiation chamber .....	28
4.4.2	Bimetallic switch irradiation chamber.....	28
4.4.3	Quartz tubes.....	28
4.4.4	UV lamps .....	29
4.5	Control .....	29
4.5.1	Control .....	29
4.5.2	Operation .....	30
4.5.2.1	Bimetallic switch control panel.....	30
4.5.2.2	Timer operation.....	31

4.5.2.3	Resetting the hours counter .....	31
4.5.3	Messages .....	31
4.6	Accessories .....	32
4.6.1	Lamp tester .....	32
4.6.2	Mercury collector .....	32
4.6.3	Face protection .....	32
4.6.4	Gloves .....	33
4.6.5	Torque screwdriver .....	33
5	Technical data .....	34
5.1	Irradiation chamber .....	34
5.2	Control panel .....	34
6	Installation.....	35
6.1	Application examples .....	35
6.2	Mechanical installation.....	36
6.3	Installation drawings .....	38
6.3.1	Vertical pipes .....	38
6.3.2	Horizontal pipes .....	39
6.4	Bypass installation .....	40
6.5	Corrosive water.....	40
6.6	Lamp socket assembly .....	42
6.7	Lamp installation.....	43
6.8	Electrical installation .....	45
7	Starting up a VGE Pro UV system .....	47
7.1	Mains voltage.....	47
7.2	Water in the system .....	47
7.3	Cooling of the UV system.....	48
7.4	Start-up procedure .....	49
8	Maintenance .....	50
8.1	Who can perform which actions? .....	51
8.2	Maintenance schedule .....	51
8.3	Quartz tube assembly .....	52
8.4	Lamp replacement .....	54
8.5	Lamp breakage.....	55
8.6	UV Lamp disposal.....	55
8.7	Decommissioning.....	56
8.8	Problem solving .....	57
8.9	Logbook.....	59
8.10	Logbook example .....	60
9	Spare parts and maintenance schedule .....	61

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9.1	Spare parts.....	61
9.2	Spare parts MultiMax .....	62
9.3	Spare parts sets .....	63
9.4	Consumable parts .....	64
10	Drawings.....	65
10.1	Dimensions .....	65
10.2	Irradiation chamber, dimensions.....	65
10.3	Control panel, dimensions .....	66
11	Certificates and declarations.....	67
11.1	CE declaration.....	67

## 1 Introduction

Thank you for choosing and purchasing a VGE International B.V. UV system.

Our UV systems are designed to reliably and safely treat your water for a long time with UV-C radiation. A great deal of attention has also been paid to a service-friendly design so that it is easy for you as a user to install and maintain the UV system.

Before you start installing the UV system in your water treatment process, you must first have carefully read and understand the complete manual in order to use the system correctly and safely. Special attention must be given to safety instructions and comments. You then check whether the delivery has arrived complete and properly.

We wish you every success with the installation and use of your VGE Pro UV system!

## 1.1 Company introduction

### VGE INTERNATIONAL B.V.

Clean and safe water is of vital importance. Sustainable developments in the field of water disinfection is therefore an important theme worldwide. VGE International B.V. is aware of this as a producer of UV-C equipment. As a company, we are therefore focused on new, sustainable developments in the field of water disinfection for the private, recreational and industrial sectors. VGE International B.V. supplies its customers with a unique range of high-quality UV-C equipment and good service. We are proud that we are part of the Dutch top technological region, Brainport Eindhoven. Innovation is our top priority. We have our own product development department, which regularly introduces new products. The existing products are also continuously examined critically and, where necessary, further developed. Our product developers ensure that the products meet the wishes and needs of the current market and the applicable safety standards. Sustainability, energy saving and environmental friendliness are central to the development and production process. Thanks to our many years of experience (since 1982), we can offer you an extensive range of UV-C equipment that is used worldwide.



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## 1.2 Our passion

### Combination of our passion for water and technology

Clean and safe water is of vital importance. Sustainable developments in the field of water disinfection is therefore an important theme worldwide. VGE International B.V. is there as a producer of UV-C systems of awareness. As a company, we are therefore focused on new, sustainable developments, solutions and technologies in the field of water disinfection. We do this by combining our passion for technology and knowledge of water, which results in high-quality products and innovations.

VGE Pro: professional water disinfection systems

The VGE Pro range consists of a complete range of industrial UV-C disinfection systems.

The devices ensure reliable and efficient water radiation. VGE Pro UV-C disinfection systems are the finishing touch in your water irradiation installation; they ensure that the water is treated efficiently against bacteria, viruses, protozoa, algae and fungi. It is essential that the UV-C system seamlessly connects to the design and the other components of a water treatment system. When you choose VGE Pro UV-C, you choose guaranteed quality at a fair price.

What makes the VGE Pro UV-C systems unique?

- VGE Pro UV-C systems have a 316L stainless steel housing or a high quality HDPE housing;
- The lamp can be placed / replaced while the unit is under pressure (except for 3S / 3L / 8L);
- Each system is equipped with the possibility to visually check the irradiation chamber whether the UV lamp (s) are (are) in operation;
- VGE Pro systems can be equipped with a UV-C sensor and/or temperature sensor;
- VGE Pro systems with low pressure UV lamps are equipped with the unique Smart Pin Technology (S.P.T.) for easy and safe replacement/placement of the lamp without disconnecting the electrical connection;
- VGE Pro systems with medium-pressure UV lamps in the are equipped with the unique Single-end Bayonet Technology (S.B.T.) lamps, ensuring a safe and simple replacement/placement of the lamp without disconnecting the electrical connection;



Medium pressure UV lamp, Single-end Bayonet Technology (S.B.T.)

- Low pressure amalgam UV lamps have a high performance level in combination with a life expectancy of 16,000 hours;
- Our medium pressure UV lamps have a wide light spectrum and therefore many extensive applications, are water temperature independent and have a long life expectancy of 9,000 hours!
- Single systems can handle a flow from 0.5 m<sup>3</sup>/h to 550 m<sup>3</sup>/h;
- It is possible to adjust the devices to your own specifications

## 1.3 Manual is intended for

This manual is intended for everyone who has to work with and with the VGE Pro UV system such as:

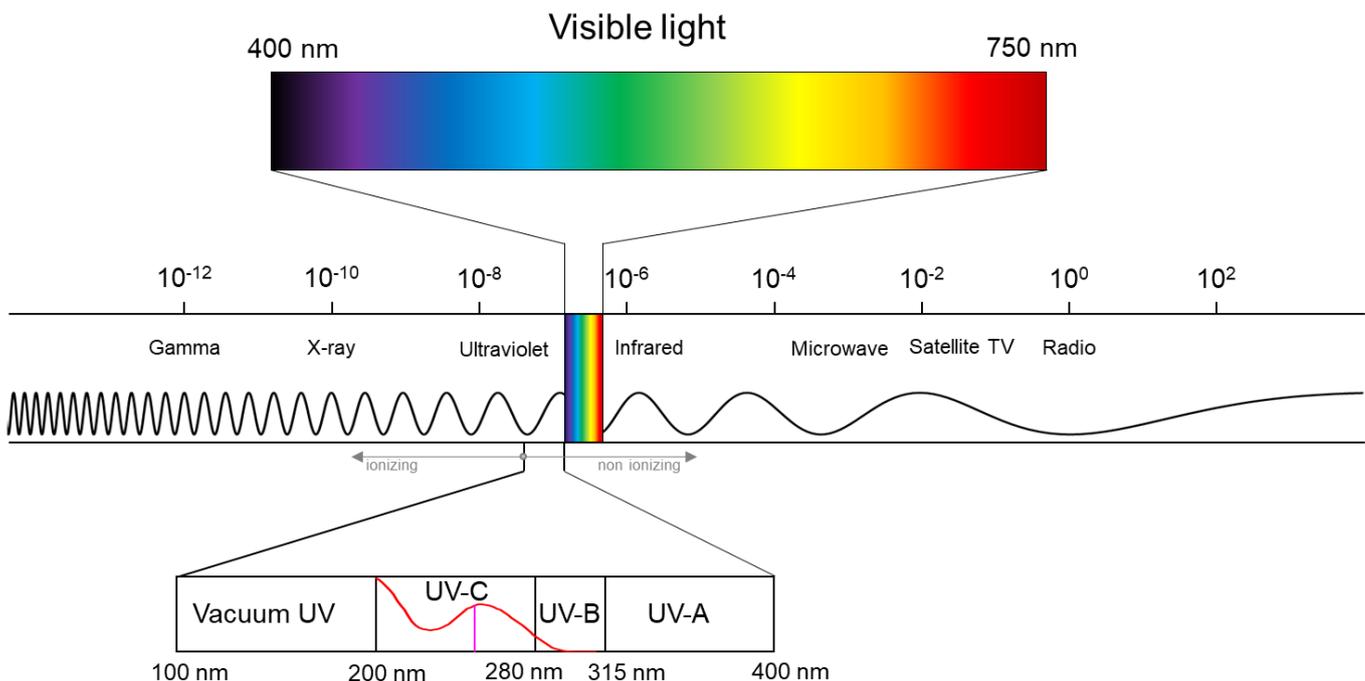
- Installation staff;
- Operating staff;
- Service staff.

All persons who wish to work on or with the VGE Pro UV system must have carefully read and understood this manual before they can use the system in a correct and safe manner. Special attention must be given to safety instructions and comments.

## 1.4 Optical radiation

Light is essential for humans. However, in some cases employees may be exposed to too much "light" during their work, which may damage eyes and/or skin. For this type of situation, the EU Directive 2006/25/EC on artificial optical radiation (1) is intended. This describes what effects can occur and what the exposure limit values are. The term optical radiation includes the visible, ultraviolet and infrared spectrum. The term light is a looser term that generally refers to the visible part of the optical spectrum.

Optical radiation is part of the family of electromagnetic radiation (EM radiation). The electricity network emits EM-fields with a very large wavelength. If we shorten the wavelength, we end up with the long wave, medium wave, short wave, ultra short wave (FM radio) on TV, GSM, microwave and radar. The following is the optical area starting with the far infrared. After the infrared, the (fairly narrow) visible area follows, followed by the ultraviolet, which cannot be seen with the human eye. After the hard UV-C, the optical area and also the non-ionizing part of the EM-spectrum ends. This is followed by the ionizing region with X-ray, gamma and cosmic radiation.



Source: Optische straling in arbeidssituaties  
Praktische aspecten bij implementatie in Nederland van de EU-richtlijn betreffende de blootstelling aan bronnen van kunstmatige optische straling  
F.P. Wieringa, C.J.P.M. Teirlinck en J.W.A.M. Alferdinck  
Review: prof. D. van Norren  
30 juni 2006  
TNO-Rapportnummer KZ/2005.190

- (1) EU. 2006. Directive 2006/25/EC of the European Parliament and of the Council of 5 April 2006 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (artificial optical radiation) (19th separate Directive in the meaning of Article 16 (1) of Directive 89/391/EEC). Official Journal of the European Union.

## 1.5 UV lamp types

UV lamps (ultraviolet) radiate optical radiation in, among others, the range between 200 nm and 400 nm on which the name "UV lamp" is also based. Low pressure (incl. Amalgam) UV lamps produce UV radiation with a wavelength of 253.7 nm where medium pressure UV lamps radiate at a wide spectrum of wavelengths (see graph with spectral data). Depending on the type of UV lamp, energy is also emitted in the visible area of the electromagnetic spectrum:

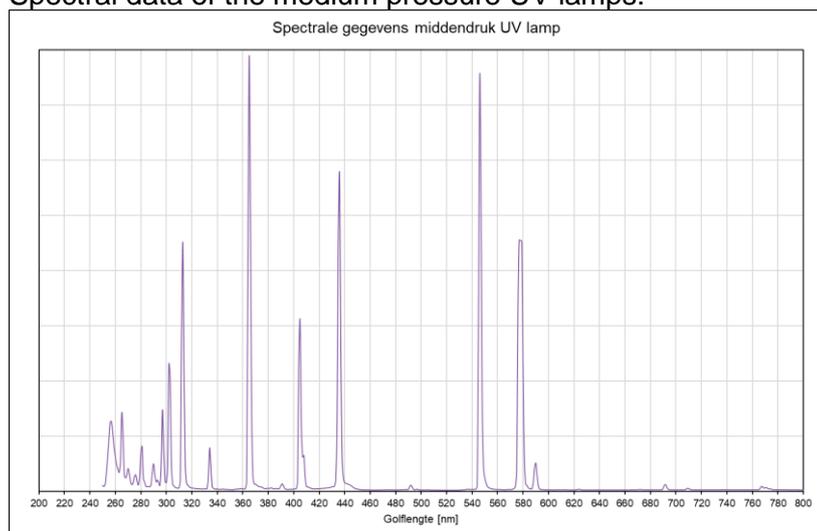
- Low pressure (LP) UV lamps: blue light (400 nm)
- Low pressure (LPHO) UV lamps: blue light (400 nm)
- Amalgam UV lamps: blue light (400 nm)
- Medium pressure (MP) UV lamps: white light (400 nm - 750 nm)

UV lamps contain a small amount of mercury that is responsible for the UV radiation produced.

A properly working UV lamp needs a certain operating temperature in order to function reliably and efficiently, with the lamps used in the VGE Pro UV series these temperatures are as follows:

- Low pressure (LP) UV lamps: approximately 45 °C
- Low pressure (LPHO) UV lamps: approximately 45 °C
- Amalgam UV lamps: approximately 95 °C
- Medium pressure (MP) UV lamps: 600 °C - 900 °C.

Spectral data of the medium pressure UV lamps:



## 1.6 UV disinfection

For non-chemical disinfection of liquids, disinfection with UV-C radiation is a proven and reliable technology that has been used since the beginning of the 20th century. From around the middle of the 20th century, the application of UV disinfection on liquids has seen a sharp increase because it then became possible to produce good quality UV-C lamps on a large scale. The discovery of the by-products produced by chemical disinfection of water also led to a strong growth in the demand for UV-C radiation for the disinfection of (drinking) water.

UV radiation (see also the section on optical radiation) can be divided into four main categories: UV-A, UV-B, UV-C and vacuum UV. The UV-C spectrum (wavelength range of 200 to 280 nanometre) is the most effective range for controlling microorganisms. UV-C radiation is capable of causing permanent damage to microorganisms. Each type of microorganism requires a certain amount of UV-C energy (UV fluence, also known as the UV dose) for the disinfection process to be successful. The microorganisms must be directly and long enough exposed to UV-C radiation, so that the radiation can penetrate the cell wall of the microorganism to damage the DNA (deoxyribonucleic acid).

Depending on the intensity of the UV-C radiation, it only takes a short time (in some cases a fraction of a second) to penetrate the cell wall, irreparably damage the DNA and inactivate the microorganisms in the water. This causes the reproductive mechanism of the microorganisms to be damaged and in some cases even killed.

UV-C disinfection is a non-selective process, as is the case with certain chemical disinfection processes. UV-C disinfection can be used against bacteria, viruses, fungi, yeasts, algae and (chlorine-resistant) protozoa.

## 1.7 Icons

This manual contains several comments with warnings that are marked with icons. Below the explanation of the icons used.

Icon	Status	Description
	Warning	Immediate danger to body and limbs. If the situation is not handled correctly, there is a risk of death and/or personal injury. Damage to the UV system can occur if the instructions are not properly followed.
	Danger	Electrical danger. Ensure that all metal parts of the VGE Pro UV installation are properly grounded, in accordance with local guidelines and laws. Before carrying out repairs or service work on the UV system, switch off the power at the main switch or remove the plug from the socket.
	Danger	Ensure proper grounding of the relevant metal parts in accordance with local guidelines and laws.
	Danger	Exposure to UV radiation (also short-term) can cause damage to the skin and eyes. Avoid contact with direct and indirect UV radiation. Wear protective, all-covering UV radiation blocking clothing to protect the skin and wear a UV radiation blocking face mask to protect the face and eyes.
	Danger	Risk of burns. Parts of the UV system and the UV lamps remain warm for a certain time after the system has been switched off. Wait long enough to touch these parts to prevent burns.
	Attention	These comments provide information to help you work on or with the UV system.
	Attention	Danger to the environment. The UV lamps contain mercury. Defective lamps must be processed by a chemical waste radiation point.
	Command	Wear UV-blocking face protection to prevent damage to eyes and skin.

	<p>Command</p>	<p>Wear UV-blocking eye protection to prevent eye damage.</p>
	<p>Command</p>	<p>Use the supplied gloves to protect quartz tubes and lamps against fingerprints and dirt that may burn in if the UV system is in operation.</p>
	<p>Command</p>	<p>Wear protective clothing that blocks UV radiation to protect all skin against UV radiation.</p>

## 2 Safety instructions



Be sure to read and understand the instructions and instructions in this section carefully before the UV system is installed and commissioned.

### 2.1 Intended use

The VGE Pro UV systems have been developed for irradiating liquids with a low viscosity such as water. Irradiating a liquid with UV radiation serves as disinfection, photolysis or as an activator of an AOP (Advanced Oxidation Process). The VGE Pro UV systems are intended for the treatment of liquids that are permeable to UV-C radiation.

The VGE Pro UV systems may not be used for applications other than those mentioned above.

The operational safety of a VGE Pro UV system is only guaranteed if it is used as intended for the specific application. The VGE Pro UV system may only be used in accordance with the purpose specified in the order and within the technical specifications of the relevant system. The VGE Pro UV systems may only be used in non-standard applications after consultation with and with the written approval of VGE International B.V .

Compliance with the intended use also includes reading this manual and complying with all instructions it contains. In addition, all inspection and maintenance work must be carried out at the prescribed intervals.

The user of a VGE Pro UV system bears full and exclusive responsibility if this device is used for any use that does not strictly and exclusively meet this intended use.

### 2.2 Safety instructions

VGE International B.V. values great importance to safety when working with or on a VGE Pro UV system, safety measures are therefore integrated in the design.



The safety instructions in this manual must be followed at all times, but they do not affect the local and/or legally applicable safety measures and instructions.



The VGE Pro UV systems have been developed according to the latest state of the art taking into account the applicable safety standards. However, if a UV system is used by non-trained personnel or if the manual has not been fully read and understood by operating personnel, there may be danger to the body and members for the personnel or third parties concerned, and the UV system may also be damaged.

Installation and maintenance as well as work that is not described in this manual may only be carried out by trained and authorized technical personnel.

The relevant supervisor of the entire system is responsible for ensuring that only trained and authorized personnel may work on and with the UV system within their responsibility.

Trained and authorized technical personnel means:

- Installation: Technical staff trained and authorized by VGE International B.V. or a hydrotechnical engineer;

- Operation: service staff who have received training and instruction from VGE International B.V. or an authorized service partner;
- Maintenance: Technical staff trained and authorized by VGE International B.V.;
- Electrical work: authorized and qualified electrician.



UV-C radiation can damage the retina of your eyes and unprotected skin. Ensure that you are not directly or indirectly exposed to UV radiation. Everyone involved must be informed about the specific hazards associated with a VGE Pro UV system.



Installation, maintenance and service work must be carried out by VGE International B.V. trained and authorized persons.



The metal control box and the irradiation chamber must be prohibited at all times with the protective ground in compliance with local rules and laws.



If, while the UV lamp is switched on, the flow of the irradiation chamber is cut off for any reason or if the irradiation chamber comes to dry completely or partially, the irradiation chamber will heat up very quickly, which may result in burning symptoms when touched. As standard, VGE Pro UV systems with medium pressure UV lamps are equipped with a temperature-sensitive monitoring switch (bimetallic switch) that moderately switches off the UV lamp (s) hardware in the event of overheating (approximately 60 °C). The maximum irradiation chamber temperature is 60 °C, damage can occur above this temperature.



Correct operation of a VGE Pro UV system is only guaranteed if original spare parts and components are used as described in this manual. If the instruction is not followed, there is a risk of malfunction or damage to the UV system. The use of non-original spare parts and components will void the warranty on the entire UV system.



Applying modifications, modifications, changes and / or extensions to a VGE Pro UV-C system is not permitted without written permission from VGE International B.V., this may have consequences for the operation and safety of the UV-C system.



Ensure that materials that have been replaced or system parts are disposed of and processed in an environmentally friendly manner in accordance with local and legal regulations.

## 2.3 Environmental conditions

For the installation, commissioning and use of a VGE Pro UV system, the following points must be observed and followed:

- protect against rain, direct sunlight and frost;
- do not use outside;
- the environment must be free of corrosive and/or explosive gases or gas mixes, steam, condensation, dripping liquids, salt-containing air and dust;
- the ambient temperature must not be lower than +5 °C and higher than + 40 °C;
- the relative humidity must not exceed 95 % and must not be condensing;
- the UV system must not be exposed to shocks and vibrations;
- the UV system must not be exposed to magnetic and/or electrostatic fields and not to ionizing radiation;
- the fluid pressure in the irradiation chamber must not exceed the maximum pressure specified in the technical specifications;
- the irradiation chamber must not be exposed to pressure surges of liquid (also known as water hammer);
- ensure that the environment of the UV system is clean and sufficiently lit.

## 2.4 Safety instructions on the UV-system

Everyone who is involved in working on or with the UV system must be informed of the dangers that may occur.

The following safety instructions and / or symbols are provided on the irradiation chamber and on / in the control box.

On the irradiation chamber:

<b>Attentie! Vorsicht! Attention!</b>	
	<p><b>NL</b> Lees de handleiding voor installatie, gebruik en onderhoud voor meer informatie!</p> <ul style="list-style-type: none"> <li>• Schakel de spanning af voordat u aan onderhoud begint en/of de unit opent!</li> <li>• Sluit de bestralingskamer af van de water toe- en afvoer en maak deze drukvrij voor begin van het onderhoud!</li> <li>• Het oppervlak en UV-lamp kunnen heet zijn!</li> <li>• Bij ingeschakelde UV-lamp(en) de bestralingskamer volledig met water doorstromen!</li> <li>• UV-licht is schadelijk voor ogen en huid!</li> <li>• In geval van toepassing in openbare zwembaden mag de UV-desinfectie alleen als aanvullende desinfectie gebruikt worden, gebruik in combinatie met een goedgekeurd desinfectie chemicaliën voor de vereiste restconcentratie!</li> </ul>
	<p><b>DE</b> Lesen Sie das Handbuch vor Installation, Bedienung und Wartung für weitere Informationen!</p> <ul style="list-style-type: none"> <li>• Schalten Sie die Stromversorgung aus, bevor Sie mit der Wartung beginnen und/oder das Gerät öffnen!</li> <li>• Schließen Sie die Bestrahlungskammer von der Wasser Zu- und Abfuhr und machen Sie sie druckfrei, bevor Sie mit der Wartung beginnen!</li> <li>• Die Oberfläche und UV-Lampe können heiß sein!</li> <li>• Bei Eingeschaltetem UV-Strahler der Bestrahlungskammer Komplet mit Wasser durchströmen!</li> <li>• UV-Licht ist schädlich für Augen und Haut!</li> <li>• Bei Verwendung in öffentlichen Schwimmbädern darf die UV-Desinfection nur als zusätzliche Desinfection verwendet werden. Verwenden Sie sie in Kombination mit einer zugelassenen Desinfectionschemikalie für die erforderliche Restkonzentration!</li> </ul>
	<p><b>GB</b> Read the manual before installation, use and maintenance for more information!</p> <ul style="list-style-type: none"> <li>• Switch off the power before you start maintenance and/or open the unit!</li> <li>• Close the irradiation chamber from the water supply and drain and make it pressure-free before starting maintenance!</li> <li>• The surface and UV lamp may be hot!</li> <li>• When the UV lamp (s) is switched on, water flow through the complete irradiation chamber must be ensured!</li> <li>• UV light is harmful to eyes and skin!</li> <li>• In case of use in public swimming pools, UV disinfection may only be used as additional disinfection, use in combination with an approved disinfection chemical for the required residual concentration!</li> </ul>
	
	

On the control panel:

	<p><b>Attentie! Vorsicht! Attention!</b></p>
	<p><b>NL</b> Voor het openen van de besturingskast de hoofdschakelaar uitschakelen!</p>
	<p><b>DE</b> Vor dem Öffnen des Steuerschranks den Hauptschalter ausschalten!</p>
	<p><b>GB</b> Before opening the control panel switch off the main switch!</p>

In the control panel:

	<p><b>Attentie! Vorsicht! Attention!</b></p>
	<p><b>NL</b> Bij uitgeschakelde hoofdschakelaar kunnen er externe vreemde spanningen aangesloten zijn!</p>
	<p><b>DE</b> Auch beim ausgeschalteten Hauptschalter können extern angeschlossene Fremdspannungen vorhanden sein!</p>
	<p><b>GB</b> Other external voltages may be present when the main switch is switched off!</p>



Make sure that the safety instructions are always and remain legible and easy to read!

## 2.5 Handling of UV lamps and quartz sleeves

The VGE Pro MP UV systems are equipped with medium pressure UV lamps and quartz tubes, the quartz parts must be clean when they are put into operation.

If a UV lamp comes in contact with the skin, traces of grease remain on the lamp. When the UV lamp is switched on, the traces of grease that remain behind block the light that wants to shine out of the lamp. Because light is converted to heat, it will become very hot at the location of the grease (or other contamination) and the lamp will burn out at this location.

To prevent the UV lamps and clean quartz tubes from being grabbed with bare hands, a set of white fabrics and lint-free gloves are included with every delivery of a new UV system.



The supplied gloves are intended to prevent UV lamps and quartz tubes from remaining clean. These gloves offer no protection against cuts due to breakage of a UV lamp or quartz tube.

Grasp UV lamps only at the ceramic parts to prevent contamination of the quartz!

## 2.6 Quartz tube breakage

To protect the UV lamps from the water, they are positioned in quartz tubes in the irradiation chamber. To ensure that the UV-C light emitted by the lamps is radiated in the liquid to be treated with minimal losses, high quality quartz tubes have been used. Quartz tubes should be handled with care and should not be exposed to large forces due to the risk of breakage.

During service work with quartz tubes, protective gloves and eye protection (preferably a face mask) must be worn to prevent possible injury.

The quartz tubes built into the irradiation chamber are robust and can handle high water pressures.

However, there are a number of reasons why quartz tubes can break during the UV-C treatment process:

- The water pressure is higher than the specified maximum pressure for the irradiation chamber;
- Water hammer, pressure change in a very short time;
- Fixed parts/objects that are led through the irradiation chamber with the water;
- Overheating of the irradiation chamber;
- Mechanical vibrations of the pipe network in which the irradiation chamber is mounted;
- At high water flow rates through the irradiation chamber, possibly causing vibrations due to cavitation.

If a quartz tube is damaged or broken, the UV system must be switched off by removing the plug from the socket. Stop the flow through the irradiation chamber by turning off the pump and/or closing valves in front of and behind the UV irradiation chamber and draining the water from the irradiation chamber.

Follow the instructions in this manual for removing the UV lamp and quartz tube and opening the irradiation chamber and carefully remove any possible quartz tube remains. Carefully follow the instructions for rebuilding the irradiation chamber and starting the process.



### Warning!

Broken quartz tube parts can be very sharp and should not end up in the process water. The user of the UV installation must therefore take measures to ensure, in the event of a quartz tube break, that quartz tube parts cannot cause damage if they end up in the process water.



If a quartz tube (or several) in a UV system cracks or breaks, the quartz tube and the relevant UV lamp connector will be filled with water. The speed with which this happens depends on the water pressure and water supply. Since the UV-lamp connector cannot stop the water, water will flow out of the UV system. The amount depends on the water pressure and water supply, which means that the space where the UV system is mounted can be filled with water.

That is why we recommend the area where the UV system is located:

- regularly check (for example daily) for water;
- provide the room with a monitoring system that can register water on the floor with a reporting system and/or pump connected to it.

## 2.7 Lamp breakage

The UV lamps which are used in the VGE Pro UV systems that are fragile and therefore need to be treated with great care. The storage of UV lamps must also be done in the original packaging to protect the lamps.



UV lamps contain a small amount of mercury (milligrams). Mercury is a metal that is liquid at room temperature and is generally poorly absorbed when ingested. The mercury vapor, on the other hand, is well absorbed by inhalation and is very toxic. It is therefore important not to allow mercury to come into contact with skin or hair and to properly ventilate the area where mercury has been released and not to breathe the vapours.

When a UV lamp is broken, mercury can be released, this must be collected and processed as chemical waste. The droplets of mercury are difficult to collect, but with a special mercury collector (see chapter 'Mercury collector') this is possible. A mercury ball can also be covered with sulphur powder, which gives it a solid shape and can be easily cleaned up. In this state, evaporation no longer occurs.

Mercury can also be released with a special mercury sponge and disposed of as chemical waste.

During service work with UV lamps, protective gloves and eye protection (preferably a face mask) must be worn to prevent possible injury.

The UV lamps built into the irradiation chamber are properly mounted, but there are a number of reasons why UV lamps can break during the UV-C irradiation process:

- Fixed parts/objects that are passed through the irradiation chamber with the water;
- Overheating of the irradiation chamber;
- Mechanical vibrations of the pipe network in which the irradiation chamber is mounted;
- At high water flow rates through the irradiation chamber, possibly causing vibrations due to cavitation.

Follow the instructions in this manual for replacing a UV lamp, if the quartz tube is also damaged, follow the instructions for replacing a quartz tube as described in this manual.

## 2.8 Electrical isolation

The UV system works with a high voltage which can be life threatening when touched. If work is to be carried out on the UV system, the system must be electrically insulated (de-energized) prior to the start by removing the power cable plug from the socket.

## 2.9 Electrical grounding



The UV system, control panel and irradiation chamber must be earthed in accordance with local rules and laws. In addition to good safety, good grounding of the irradiation chamber reduces the risk of possible electrolytic corrosion.

## 2.10 Operating conditions



The VGE Pro INOX MP series UV systems can operate at an ambient temperature between +5 °C and +40 °C and at a relative humidity of 10% to 95% (non-condensing).

Before switching on the UV lamps, the irradiation chamber must be completely filled and flowed through with sufficient water. This is to prevent dangerous situations for the UV system, the environment and users.

The water that flows through the UV system may have a temperature between +1 °C and +60 °C. A bimetallic switch is mounted on the irradiation chamber as protection, which switches off the UV lamp at a maximum irradiation chamber temperature of +60 °C. The irradiation chamber can operate with a maximum operating pressure of the water of 10 bar. Water hammer can irreversibly damage the irradiation chamber or parts thereof.

The control panel and the irradiation chamber must not be mounted in direct sunlight and must be protected against rain and other moist precipitation. The environment must be free of chemical vapours, (liquids) substances and/or radiation that can damage the UV system. The control panel and irradiation chamber must also be mounted vibration-free.

## 3 Scope of delivery, transport and storage

### 3.1 Scope of delivery

Immediately after receipt, check the delivery for completeness and visible damage on the basis of the waybill. Contact the supplier immediately if the product is incomplete or damaged.

The delivery of a UV system includes:

- Irradiation;
- Control panel (depending on the model with mounted or separately supplied cables);
- One or more UV lamps (depending on the model);
- Instruction manual;
- A set of gloves.

The following accessories may be supplied depending on the order:

- Safety glasses;
- Lamp tester;
- Mercury collector;
- Torque screwdriver with suitable bit.

### 3.2 Transportation

The VGE Pro UV systems are packaged in a sound manner so that they are suitable for transport. Always transport the UV systems in the VGE International B.V. packaging materials as supplied.

Always transport the product in a safe and responsible manner, the packaging must always be handled with care and not exposed to rain and moisture. Sensitive parts have been incorporated in the UV installation.

Check the packaging for damage immediately upon receipt of the UV system. If damage is found, it must be reported immediately to the transport company. Failure to do so will void the right to compensation.

There is a risk of (im)material damage if the UV installation (or part of it) falls or is damaged.



If the UV irradiation chamber has been dropped and/or damaged, the following parts may be damaged or defective:

- Irradiation chamber;
- UV lamp(s);
- Quartz sleeve(s);
- Ceramic lamp connection(s);
- Present sensor(s);
- Cables.



In the case of a damaged UV lamp or quartz tube, follow the instructions stated in the sections 'Lamp breakage' and 'Quartz tube breakage'.

Always wear cut protective gloves when clearing quartz fragments/residue!



The electrical connections are not suitable for mechanical loading. The product must never be lifted or transported at the electrical connections.

The UV systems are supplied with the UV lamps packed separately.

If a UV system has to be moved to another location after installation, the following must be taken into account:

- Remove the UV lamps from the irradiation chamber and package them in their original packaging;
- Ensure that the cables connected to the UV system are completely disconnected;
- Pack the UV system in such a way that it cannot be damaged or contaminated during transport;
- If necessary, use properly maintained and approved lifting material to prevent damage to the irradiation chamber and/or control panel;
- Cables may not be used to lift or move the irradiation chamber and/or the control panel.

Upon receipt of the UV system, check whether the delivery is complete based on the waybill.

## 3.3 Storage

If possible, only unpack the product shortly before assembly.

Protect the product during storage against:

- Rain and moisture;
- Dust and dirt;
- Shocks and vibrations;
- Radiation (electromagnetic, electrostatic and ionizing);
- Temperatures outside the range of +1 °C to +60 °C.

If a UV system is (temporarily) taken out of operation, we recommend rinsing the irradiation chamber with clean water to remove sand, salt and other corrosive substances to prevent corrosion. Ensure that the irradiation chamber is dry and clean to prevent contamination, microbiological contamination and corrosion.

If a UV system is (temporarily) taken out of operation and dismantled, we recommend that the individual components are stored in their original packaging and that the above storage instructions are observed. Make sure the irradiation chamber is dry and clean to prevent contamination, microbiological contamination and corrosion.

## 3.4 Warranty

The warranty period for our VGE Pro UV systems is twelve (12) months from the moment of acceptance (acceptance is the first use of the relevant UV system or a validated acceptance/start-up protocol). The moment of acceptance must be within three (3) months after shipment of the relevant product. If the acceptance is not realized within three (3) months after shipment, the warranty period starts on the date three (3) months after the shipment date. Consumables (for example: UV lamps, quartz tubes, O-rings, etc.) of the VGE Pro UV systems are excluded from this warranty. A prerequisite for this guarantee period is error-free installation and start-up, fully documented periodic inspection and maintenance on a minimum of half a year and the operating instructions must be followed.

## 4 The UV system

### 4.1 UV applications

Irradiating water (and other liquids) with UV light has now become a proven and widely used environmentally-friendly way to achieve reliable disinfection without chemicals, especially in applications where no deposit operation is necessary. UV disinfection has the following advantages:

- Fast disinfection, no exposure time required (system dependent only a fraction of a second);
- No disinfection by-products;
- No odour and taste changes to the water;
- UV radiation is not corrosive.

With correct dimensioning, UV systems are also applied for reducing bound chlorine (chloramine) in swimming pool applications. This has the following positive effects:

- Decrease in the typical pool odour;
- Extra disinfection, also from chlorine-resistant organisms;
- Strong decrease in:
  - Red eyes;
  - Headache;
  - Skin and mucous membrane irritations;
  - Stress among swimming pool staff;
- Improved "wellness" effect:
  - Clearer water;
  - More pleasant indoor climate;
  - Enthusiastic swimmers and increase in visitor numbers.
- German DIN 19643 and Austrian M 5890 standards specify the use of medium-pressure UV lamps for breaking down bound chlorine in swimming pool applications.

Furthermore, there are also applications in which UV is used in combination with hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>), ozone (O<sub>3</sub>) or other oxidizing agents to produce OH radicals that have a very high oxidation potential with which non-filterable, difficult-to-degradable substances can be oxidized. The collective name for this type of application is Advanced Oxidation Process (AOP).

Regardless of the application, it can generally be said that a UV system is positioned in the water treatment after filtration. If products still need to be added to the water or if the water needs to be heated, it is advisable to do this after the UV radiation of the water.

## 4.2 Product overview

<b>VGE Pro INOX MP UV product overview</b>				
<b>VGE Pro MP INOX unit</b>	<b>MultiMax</b>	<b>600-85</b>	<b>600-85</b>	<b>1200-85</b>
Housing	SS 316L	SS 316L	SS 316L	SS 316L
Housing shape	inline	inline	inline	inline
Maximum working pressure	10 bar	10 bar	10 bar	10 bar
Connections	2" outside threat, male	DN80 flange	DN80 flange	DN80 flange
UV-C lamp type	Medium pressure	Medium pressure	Medium pressure	Medium pressure
Number of lamps	1	1	1	2
Lamp power	400 W	600 W	600 W	600 W
Lamp power supply	Electronic ballast	Electronic ballast	Electronic ballast	Electronic ballast
Lamp life	9000 h	9000 h	9000 h	9000 h
Flow rate (cooling - @ 3 m/s)	1 - 22 m <sup>3</sup> /h	1 - 22 m <sup>3</sup> /h	1 - 22 m <sup>3</sup> /h	1 - 22 m <sup>3</sup> /h
Featuring	Single ended lamp	Single ended lamp	Single ended lamp	Single ended lamp
	Compact controller	Compact controller	Comfort controller	Comfort controller
	Interlock remote control	Interlock remote control	Remote control	Remote control
			Optional UV sensor	Optional UV sensor
			Optional temperature sensor	Optional temperature sensor
			Optional ModBus	Optional ModBus

## 4.3 UV system composition

A VGE Pro UV system is always composed of a UV irradiation chamber and a control panel, both of which are interconnected with supplied cables for controlling the UV lamp. The irradiation chamber must also be grounded.



The heart of the UV system is the irradiation chamber which is provided with one medium-pressure UV lamp which combines a compact design with a high lamp power. An inline design of the irradiation chamber has been chosen with a UV lamp placed perpendicular to the direction of the flow in order to obtain good irradiation of the water in combination with a very low hydraulic pressure loss.

The choice of the irradiation chamber, the UV lamp type and the number of lamps is tailored to the application in order to realize a reliable irradiation of the water with the least possible loss of pressure.

The control panel controls the UV lamp through an electronic ballast with high efficiency. The control panel also ensures that it is not possible to switch the UV lamp on again immediately after switching off (10 minutes waiting time) and when the end of the UV lamp life is approaching, an indicator LED will flash.



### Attention!

After switching on the unit locally, via a remote signal or flow switch, it will always take approx. 10 minutes before the UV lamp is switched on.

## 4.4 Irradiation chamber

### 4.4.1 Irradiation chamber

The heart of a VGE Pro MP UV system is the irradiation chamber in an inline construction which, in combination with the medium pressure UV lamp, gives a low pressure loss and is easy to install because the supply and discharge are in one line.

Due to the compact design, no sampling connections are available on the irradiation chamber because they would be directly treated with UV light, which should not be the case with sampling connections.

The UV lamp is mounted in a lamp socket. No cap and/or cable needs to be removed to remove or install the UV lamp, the cable for controlling the UV lamp is connected to the lamp socket and remains connected to it.

The UV lamp comes with a lamp base with 2 contacts that make contact with the UV lamp socket. The UV lamp is equipped with a return wire so that only one-sided mounting of the UV lamp is required, this also saves installation and service space.

As a basic protection against overheating of the irradiation chamber, a bimetallic switch is attached to the chamber by means of a wire end, which immediately switches off the UV lamp when the maximum irradiation chamber temperature is exceeded.

### 4.4.2 Bimetallic switch irradiation chamber

A bimetallic switch is provided as standard on the irradiation chamber to monitor the irradiation chamber temperature. The bimetallic switch is closed as standard so that the UV lamp can be switched on.



The irradiation chamber temperature can become too high (> 60 °C) if the irradiation chamber contains no water or is not completely filled with water or if there is no flow with an UV lamp switched on. If the bimetallic switch is activated, the UV lamp will be switched off immediately.

The bimetallic switch has an automatic reset function, as soon as the bimetallic switch has cooled down sufficiently (approximately 45 °C (irradiation chamber)), the contact will automatically close again.

### 4.4.3 Quartz tubes

Because UV lamps cannot be placed directly in the water (they do not reach their operating temperature, so the UV production does not reach the desired level or they switch off again), they are placed in a protective UV-C-permeable quartz tube in the irradiation chamber. In the VGE Pro UV MP series the quartz tubes are mounted in such a way that the UV lamp can be replaced without dismantling the quartz tube while the water pressure remains on the irradiation chamber. In order to have as few openings as possible in the irradiation chamber (better for hygienic applications), a quartz tube is used that is closed on one side. As a result, only on one side of the irradiation chamber free service space is required.

The quartz tubes are made of high quality quartz in order to allow the entire UV spectrum radiated by the UV lamp to pass through with the lowest possible losses.

Depending on the water quality, quartz tubes can become dirty. It is therefore important to ensure that, if necessary, the tubes are regularly cleaned or replaced. See the 'Maintenance' chapter for this.

## 4.4.4 UV lamps

The VGE Pro UV medium pressure UV lamps feature the unique S.B.T. (Single-end Bayonet Technology) concept. The lamps are one-sided (Single-end) installed. If the lamp is completely inserted in the quartz tube and the lamp socket, it can be fixed with a short rotation.



When working on the lamps, wait at least 15 minutes after switching off the UV system before dismantling the lamps. Before dismantling the lamps and/or quartz tubes after the lamps have been in operation, the temperature of the components must be checked to prevent burns.



UV lamps, both low pressure (incl. Amalgam) and medium pressure, emit UV radiation which can cause damage to skin and eyes.



See the chapter 'Lamp breakage' in the event of a lamp breakage.

## 4.5 Control

### 4.5.1 Control

The control consists of a completely closed control box with the cables connected. The control box cannot and may not be opened. Cables may not be shortened or extended.

The control box is designed to be mounted on the wall and can easily be connected to the electricity grid with a plug.



Before the control system is connected to the electricity grid and the lamp is switched on, the irradiation chamber must be completely and properly installed in the relevant pipeline network, flow through with sufficient water and be completely connected to the control cabinet.



The UV system must be connected to a properly earthed socket with the cable fitted to the control box and plug.

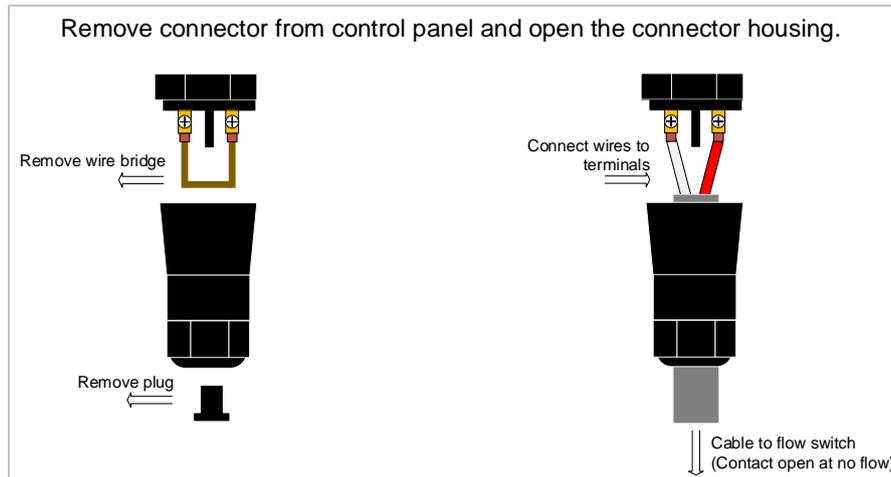
The cable length between the control and UV irradiation chamber is approximately 2 m, the cable with plug for connection to the electricity grid has a length of approximately 1 m.



The UV lamp may only be switched on if it is 100% certain that the UV irradiation chamber is completely filled with water and that it is continuously circulated with sufficient water. The irradiation chamber bimetallic switch must also be mounted correctly on the irradiation chamber.

## 4.5.2 Operation

The control panel is supplied as standard with a connector with an internal connection between the two internal connections. The lamp cannot be switched on without this connector being plugged into the chassis part on the control panel. The through-connection present in the connector can be replaced by a flow switch or another potential-free contact (for external control).



The control contains a fuse to protect against electrical overload and a bimetallic switch for monitoring control at too high temperatures. There is also a bimetallic switch on the irradiation chamber for monitoring the irradiation chamber temperature. Both bimetallic switches are closed as standard so that the UV lamp can be switched on.



### Attention!

After cooling of the irradiation chamber and/or control panel, the lamp will be switched on again automatically if the control signal is available for this. Check the operation and conditions of the UV installation regularly (daily).

If a flow switch or an external potential-free contact is used for controlling the UV lamp, it will take approximately 10 minutes before the UV lamp is switched on after activation. This is to ensure that a switched-off UV lamp is not switched on again within its cooling time. As a result, the UV lamp would be overloaded and the life of the lamp would be adversely affected.

If no external signal is used for control, the plug with a connection must be placed in the connector. When the mains voltage is switched on, the waiting time of approximately 10 minutes will be started immediately to switch on the UV lamp after this.

When the external control signal and/or the mains voltage is removed, the UV lamp will be switched off immediately.

If an external control contact is used to switch the UV lamp on / off, then this contact must be able to switch at least 264 Vac, 1 A, AC1.

### 4.5.2.1 Bimetallic switch control panel

A bimetallic switch is provided as standard in the control panel to monitor the temperature. The bimetallic switch are closed as standard so that the UV lamp can be switched on.



If the control panel temperature becomes too high (> 50 °C) due to a too high ambient temperature, the bimetallic switch will be activated and the UV lamp will switch off. If the bimetallic switch is activated, the UV lamp will be switched off immediately.

The bimetallic switches has an automatic reset function, as soon as the bimetallic switch has cooled down sufficiently (approximately 35 °C (control panel), the contact will automatically close again.

#### 4.5.2.2 Timer operation



On the front of the control is a sticker with the VGE logo, a push button and an LED indicator.

LED

Push button

If the UV system is switched on, the program will check itself. The LED will flash red rapidly for approximately 1 second. After this the LED lights up green, blinks green or lights up red. This depends on the number of hours that the system has already been in operation.

When the UV lamp is first switched on or after the "reset" function is used, the internal operating hour counter has a value of 9,000 hours. The number of operating hours is adjusted to the lamp in your device. Each UV lamp has a maximum number of operating hours, during which the lamp guarantees optimum disinfection. If the number of operating hours of the UV lamp has been reached, it must be replaced. When the system is switched off or after a power failure, the system will remember the remaining number of operating hours. After switching on, the system will continue to count from the moment it was stopped.

Operating hours counter status:

- Green burn: the UV-C lamp burns within the normal lifespan;
- Flashing green: the UV-C lamp needs replacement within 500 hours;
- Red light: the UV-C lamp must be replaced as soon as possible.

#### 4.5.2.3 Resetting the hours counter

After replacing the UV lamp, the operating hours counter must also be reset. A reset resets the operating hours counter to 9,000 hours.

Resetting the operating hours counter:

- Hold down the push button;
- The LED will flash quickly and then turn green. This takes a total of approximately 5 seconds;
- As soon as the hour counter lights up green, you can release the push button;
- The operation hours counter will start a new cycle.

#### 4.5.3 Messages

The "Compact" control is very basic in its functionality, to check whether the UV lamp is in operation, the optical control in the lamp base must be viewed, if it lights up then the lamp is switched on. There is also an

operating hour indicator on the control that lights up or blinks depending on the number of operating hours. See the chapter "LED hour meter" for a description of the functionality.

## 4.6 Accessories

### 4.6.1 Lamp tester



The medium pressure UV lamps used in the VGE Pro MP UV systems have a long life expectancy of 9,000 hours.

However, it is possible that a lamp will not start, to be able to check whether a lamp can still start you can use our UV lamp tester.

By simply holding the metal tip of the lamp tester against the quartz of the lamp or pressing one of the electrical connections and then pressing the test button, this light will illuminate blue when the lamp is still functioning.

The lamp must be completely removed from the irradiation chamber for testing.

Article number: SP0055

### 4.6.2 Mercury collector



The UV lamps used in the VGE Pro MP UV systems contain a small amount of mercury. If a lamp breaks, this mercury can be released and since the mercury vapor is toxic, mercury released must be completely cleaned up as quickly as possible.

Because of its liquid properties, mercury is difficult to collect and pick up, we advise you to have a mercury collector ready and to use it to clean up spilled mercury.

Article number: SP0057



Ensure that when mercury is released, this is cleaned up as quickly as possible and that the room is well ventilated!

### 4.6.3 Face protection

With normal use of a VGE Pro UV system, UV light cannot escape. If a UV system is equipped with a UV sensor that is placed in a so-called measuring window, UV light can be radiated into the room during a reference measurement. This UV light can be harmful to the environment that is being radiated.

Because it is inevitable when carrying out a reference measurement that you come into contact with UV light, you should protect yourself well against this. See chapter "Safety instructions".



To ensure that the face is protected from UV radiation, we recommend that you use a polycarbonate face shield in addition to good, fully covering clothing. You can order this from us.

#### 4.6.4 Gloves



The VGE Pro MP UV systems are equipped with medium pressure UV lamps and quartz tubes, the quartz parts must be clean when they are put into operation. If a UV lamp comes in contact with the skin, traces of grease remain on the lamp. When the UV lamp is switched on, the traces of grease that remain behind block the light that wants to shine out of the lamp. Because light is converted to heat, it will become very hot at the location of the fat (or other contamination) and the lamp will burn out at this location.

To prevent the UV lamps from being grabbed with bare hands, a set of white fabrics and lint-free gloves are supplied as standard with every delivery of a new UV system. If these gloves are worn or dirty, new ones can be ordered with article number: B299800

#### 4.6.5 Torque screwdriver

To be able to mount the ceramic lamp socket correctly, the screws must be tightened with a specified torque. If the correct torque is used, the ceramic lamp socket will not be damaged and the seal will get sufficient pressure to properly seal the irradiation chamber.



The torque screwdriver can be ordered from us with the article number: SP0058

## 5 Technical data

### 5.1 Irradiation chamber

The VGE MultiMax UV system has an irradiation chamber with an inline design to create a compact design that is easy to install in existing but also new water treatment installations.

Description	Specifications
Material	Stainless steel 316L
Maximum water pressure	10 bar
Finish, internal	RA 0,8 µm (except weld seam, optionally possible)
Finish, external	Glass bead blasted
Protection	IP54
Environment temperature, storage	+1 °C till +60 °C
Environment temperature, operation	+5 °C till +40 °C
Max. relative humidity	95 %, not condensing
Number of lamps	1
Lamp	400 W
Lamp connection	S.B.T. (Single-end Bayonet Technology)
Weight, dry	2 kg
Weight, wet	3 kg
Connection	2" male thread
Installation length	156 mm

### 5.2 Control panel

The UV system comes standard with a Compact controller for controlling the UV lamps, process monitoring and the interface with the "outside world".

Description	Specifications
Material	Aluminium wall-mounted housing
Finish	Structure powder coating, RAL 7035
Protection	IP54
Ambient temperature, storage	-20 °C till +60 °C
Ambient temperature, operation	+5 °C till +40 °C
Max relative humidity	95 %, not condensing
Environment	Protected against direct sunlight and rain
Installation height	Max. 2,000 m
Supply voltage	1/N/PE 180-264 Vac 50/60 Hz
Power consumption	425 W
Working factor, cos φ	0,98
Dimensions (H x W x D)	460 x 250 x 150 mm
Weight	5 kg

## 6 Installation

### 6.1 Application examples

UV disinfection is a method for inactivating microorganisms in the water and thereby disinfecting the water without using chemicals and without influencing the odour and taste of the water. It is also a non-selective disinfection technique where the dose must be adjusted depending on the type of microorganism. As far as known, there are no UV-resistant microorganisms. Cryptosporidium and Giardia protozoa are known to have very high chlorine and ozone resistance but only require a low UV dose for inactivation.

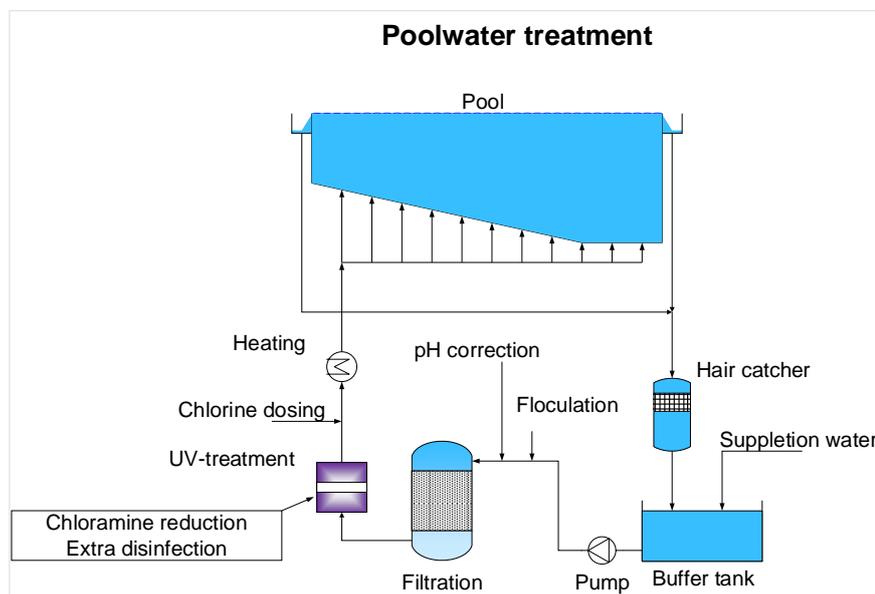
UV disinfection can be applied effectively, including applications in:

- Drinking water;
- Waste water;
- Swimming pools (private);
- Soft drink industry;
- Breweries;
- Aqua culture;
- Horticulture;
- Food industry:
  - o Washing water disinfection;
  - o Transport water disinfection;
  - o Packaging water disinfection;
  - o Process water disinfection;
  - o Product water disinfection;
- Offshore Industry, injection water;
- Electronics industry;
- Automotive industry;
- Irrigation water;
- Maritime applications;
- Paper industry;
- Petro and chemical industry;
- Snow production machines;
- Mobile applications such as in trains.

Furthermore, with correct dimensioning (higher UV doses than are necessary with disinfection), UV radiation can also be used for oxidative applications. Due to photolysis properties of UV radiation, UV systems can be used very effectively in the reduction of bound chlorine (chloramine) that has the so-called "swimming pool" odour and e.g. cause red eyes in swimmers.

UV radiation can also be used as a catalyst in so-called "Advanced Oxidation Processes" (AOP). The UV radiation is used to oxidize an oxidizing agent (e.g.  $H_2O_2$ ,  $O_3$ ,  $Cl$ , etc.) by means of photolysis. This process releases hydroxyl radicals ( $\cdot OH$ ) that have the second highest oxidation potential (2.80 V) which micro-contaminants can be broken down in the water.

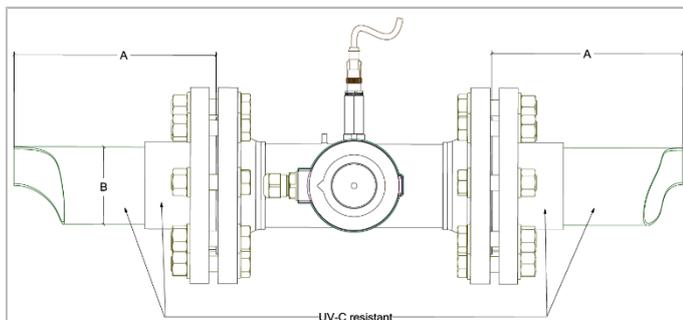
Below an typical pool water treatment process with the location of the UV system indicated.



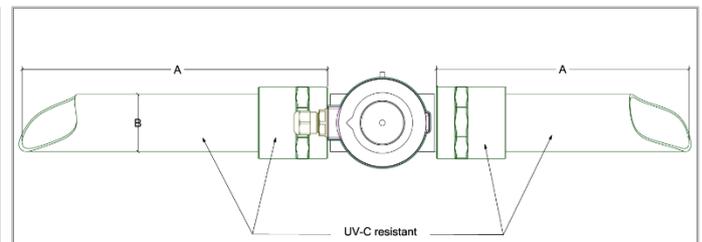
## 6.2 Mechanical installation

The following aspects must be taken into consideration when installing the irradiation chamber:

- The irradiation chamber must be mechanically fixed. This can be done by e.g. attaching the connecting flanges to a mounting frame or building by means of a console. With fixed metal pipes in which the irradiation chamber is mounted, no additional fixation of the irradiation chamber is usually required;
- The irradiation chamber must be mounted free of any mechanical stress;
- The irradiation chamber can be installed in both a horizontal pipe and a vertical pipe;
- It is necessary that the irradiation chamber is mounted in such a way that the UV lamp is always placed completely horizontally;
- If the irradiation chamber is mounted in a vertical line, it is recommended to flow through the irradiation chamber from bottom to top, in order to prevent air from remaining in the irradiation chamber;
- For an installation in a horizontal pipe, care must be taken to ensure that no air can remain in the pipe and irradiation chamber by installing a properly functioning ventilation system;
- The irradiation chamber can best be installed on the pressure side of a pump;
- In connection with the return wire of the UV lamp, there is a preferred flow direction, depending on how the lamp holder is mounted, it can be changed. The cable from the lamp holder indicates the flow direction, this means that the arrow on the lamp socket also points in the flow direction;
- The VGE Pro INOX MP systems are designed for a working pressure of up to 10 bar;
- The irradiation chamber may only be put into operation if it has been properly grounded by skilled personnel, for this the irradiation chamber is provided with a threaded end with an earth symbol. The earthing cable (not supplied) must be connected to the wire end, which must also be connected to the earthing terminal in the control box for this purpose;
- The irradiation chamber has been developed for installation in a dry and clean environment out of the direct sunlight. Humid air, dust particles and dirt in combination with aggressive vapours/air (such as chlorine vapor, hydrochloric acid vapor, salt air, etc.) can cause corrosion to the UV system, so ensure that your system remains clean;
- A irradiation chamber is made of 316L stainless steel and must therefore be mounted in a piping system in which other metal components are used that are also made of stainless steel 316L to prevent electrolytic corrosion;
- Use suitable UV-C resistant seals for mounting the irradiation chamber;
- All materials that are directly or indirectly exposed to UV light must be made of UV-C resistant material (think of plastic pipes, seals of valves, valves, flow meters, etc.). When using plastic pipes one can e.g. use black HDPE as a UV-resistant material. PVC is not UV resistant, the plasticizers present in the PVC are broken down by the UV light, making the material hard and brittle with an increased risk of breakage;
- The radiation depth of UV light in the pipes (radiation zone) before and after the irradiation chamber depends on the UV transmittance of the water. As a guideline, 5 x the pipe diameter with a minimum length of 0.5 m is used as the radiation depth where the material used must be UV-resistant;



Drawing 19



Drawing 35

$A \geq 5 \times B$  (minimaal 0,5 m)

- Although the irradiation chamber is made of stainless steel 316L, it can still corrode. It is therefore important to regularly clean the irradiation chamber to prevent precipitated dirt from causing corrosion. Starting corrosion must be professionally removed and repaired;

- 
- Never position sampling points on an irradiation chamber, the sampling connections must be outside the range of UV radiation. For this, the above-mentioned radiation depth can be used as a distance;
  - When mounting the irradiation chamber, ensure that sufficient space is available around it for replacing quartz tubes and UV lamps and for safely performing maintenance and service work;
  - For an ideal hydraulic installation, a straight pipe length of 7 x the pipe diameter before the irradiation chamber and 5 x the pipe diameter after the irradiation chamber is recommended;
  - If you want to install 90° bends directly before and/or after the irradiation chamber, it is advisable not to choose a bend radius smaller than 1.5 x the pipe diameter;
  - During the installation of the irradiation chamber, ensure that no objects remain in the pipes or irradiation chamber that could damage the UV system when starting the flow;
  - After mounting the pipe, fill the irradiation chamber slowly to prevent damage due to water hammer;
  - Before mounting the lamp and putting the UV system into operation, check the system for leaks and repair it before putting it into operation;
  - After installation of the pipes and irradiation chamber, it is recommended to clean the entire hydraulic system before commissioning.

## 6.3 Installation drawings

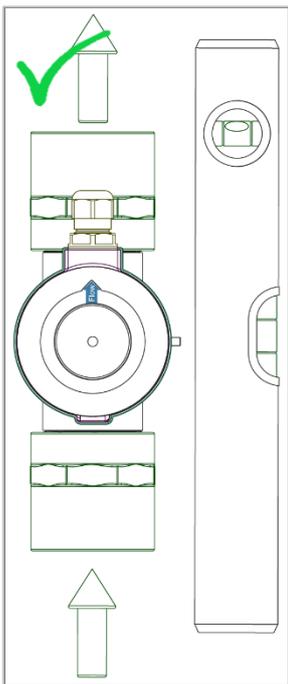
The VGE Pro MP systems can be mounted in both horizontal and vertical pipes. When mounting, however, care must be taken that the UV lamp(s) are always placed horizontally. Below are some examples of how the UV system can be installed.

The UV systems can be flowed through in both directions, the lamp holder must be mounted depending on the flow direction. There is an arrow on the lamp base that must correspond to the flow direction and because the lamp can only be placed in the lamp holder in one way, it is important to position it correctly. With correct installation, the arrow on the lamp base points in the direction of the flow and in the direction of the cable gland of the lamp holder.

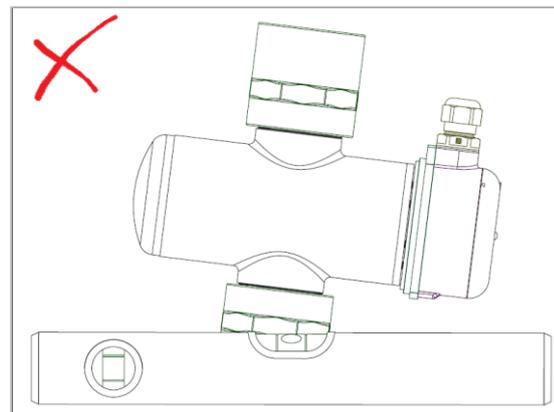
The cable gland in the lamp holder must therefore be mounted with the flow direction, see the examples below.

### 6.3.1 Vertical pipes

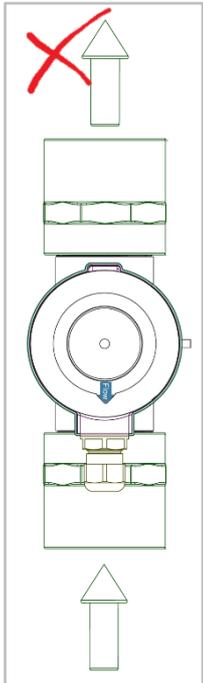
The VGE Pro MultiMax systems are preferably be installed in a vertical pipe. The recommended flow direction is upwards, as a result of which air is forced out of the irradiation chamber. With downward flow, there is a risk that air will remain in the irradiation chamber if the back pressure is too low. Note the direction of flow of the water and the position of the lamp holder (cable gland). With correct lamp holder mounting, the arrow points to the lamp base in the direction of the flow.



Correct vertical assembly.



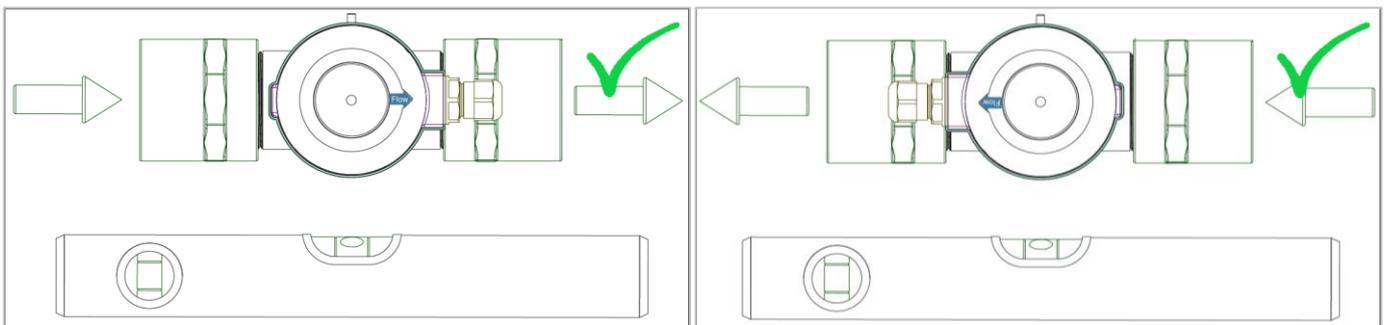
Incorrect vertical mounting, the lamp is not placed horizontally.



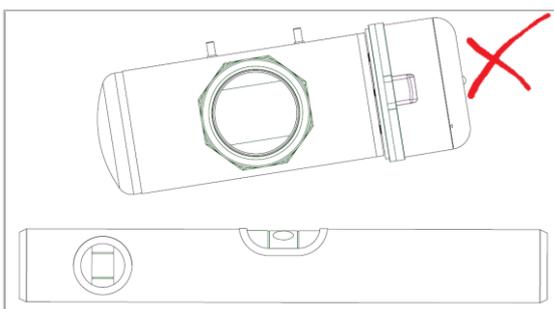
Incorrect mounting of the lamp holder, the arrow on the lamp base must point with the direction of flow and not as shown here against the direction of flow.

### 6.3.2 Horizontal pipes

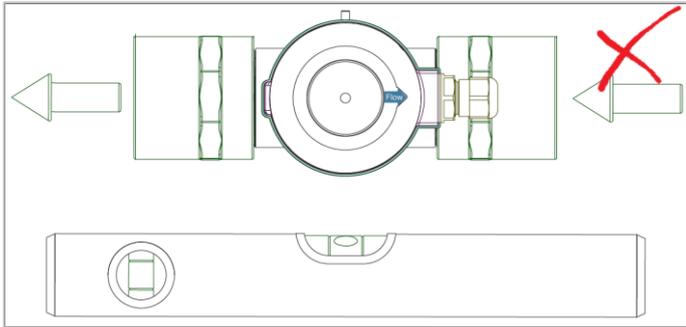
The VGE Pro MP systems can be flowed through in horizontal direction in both directions. Note the direction of flow of the water and the position of the lamp holder (cable gland). With correct lamp holder mounting, the arrow points to the lamp base in the direction of flow.



Correct horizontal mounting.



Incorrect horizontal mounting, the lamp is not placed horizontally.



Incorrect mounting of the lamp holder, the arrow on the lamp base must point with the direction of flow and not as shown here against the direction of flow.

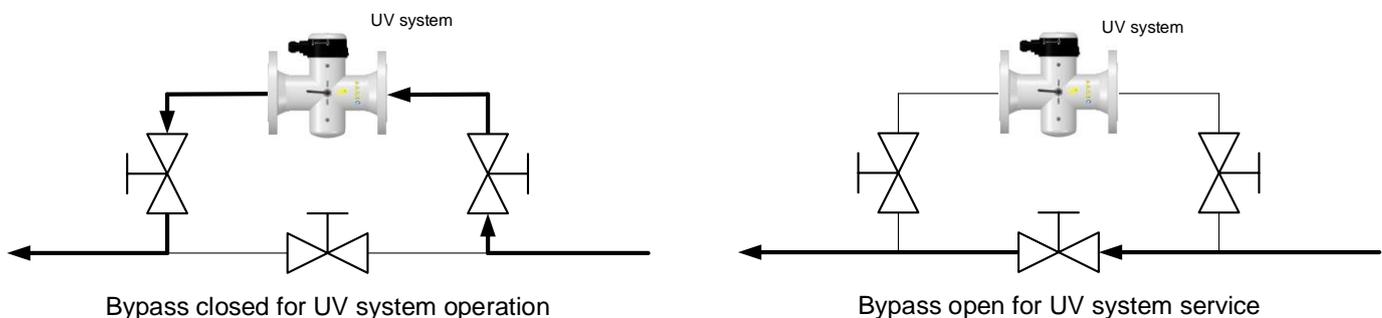
## 6.4 Bypass installation

In order not to have to stop the operating process during service work on the irradiation chamber, which must be opened, it is advisable to place the UV system in a bypass.



If the water to be treated is no longer flowing through the UV irradiation chamber, this water is no longer disinfected/treated. The following measures must be taken:

- Alternative (chemical) disinfection of the water;
- Do not use and drain the water;
- Stop water flow;
- No UV irradiation of the water for a short time is no problem (circulation of swimming pool water where chloramine is reduced), no measures.



When disinfecting liquids, the full flow must flow through the UV system, if only 1% of the flow does not flow through the irradiation chamber, a log 2 reduction of microorganisms is the maximum attainable. An exception to this is a process in which the water is circulated in which only a part flows through the UV system, which controls the amount of microorganisms required for the specific process.

When reducing the bound chlorine (chloramine) in swimming pool water, the UV system must be dimensioned for the total circulation flow that goes through the water treatment. If the UV system is dimensioned for a partial flow of the total flow, the reduction of the bound chlorine will take longer or even will be unrecordable. Always dimension a UV system to be used in swimming pools at the full circulation flow rate and install the UV system in such a way.

## 6.5 Corrosive water

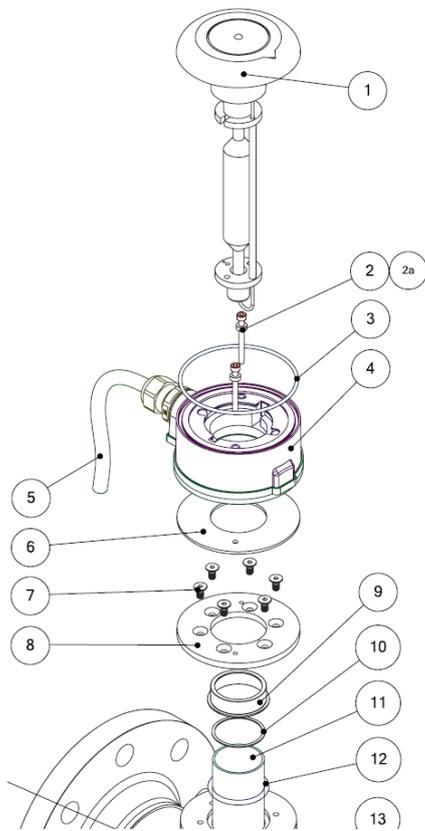
The VGE Pro INOX systems are made of stainless steel in the quality 316L, which is a material that is excellent for applications in, among other things, the drinking water industry or swimming pool installations due to the low corrosive properties of the water.

For applications with seawater or brine, stainless steel 316L may not be corrosion resistant enough, in this case we would like to point out that we have an extensive series of UV systems with an irradiation chamber made of HDPE for this type of application.

Up to a chloride content of up to 800 mg/l in the water to be treated, an irradiation chamber of stainless steel 316L can usually be used.

It is not permitted to allow a liquid to flow through the reactor, or to add additives to the water to be treated, which may have a negative effect on corrosion or degradation of the materials used. This to prevent dangerous situations, damage to the reactor and surrounding installations and/or flora and fauna.

## 6.6 Lamp socket assembly

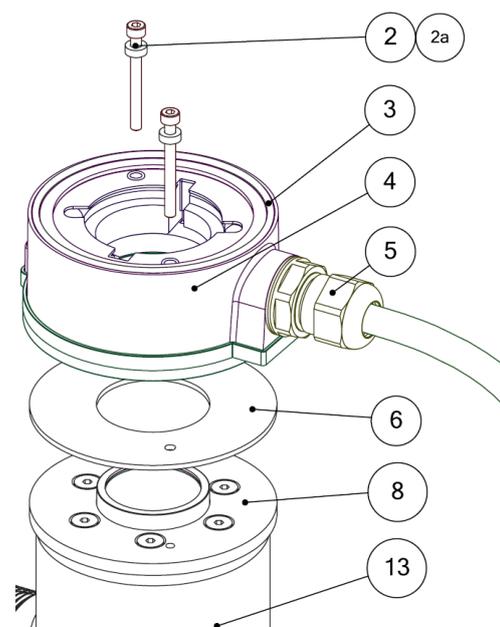


Drawing 2

The lamp socket (4) is the electrical connection between the lamp and the lamp driver. It also plays an important role in the positioning and temperature management of the lamp. The lamp socket is mounted onto the mounting flange (8) by two screws and plastic spacers (2, 2a). The mounting holes are symmetrically positioned on the mounting flange, allowing the lamp socket to be mounted in two ways. In other words the socket can be rotated 180°.

The lamp socket must be mounted so that the cable(gland) (5) points in the direction of the water flow. (see Chapter 'Installation drawings' for correct and incorrect positioning)

If the lamp socket is mounted correctly in relation to the water flow, the return wire is always "downstream". This is important for optimum irradiation of the water.



Drawing 28

Ensure that the O-ring (3) is not lost. Tip: store it temporarily. Insert both M4x45 screws (2) with the spacers (2a) around them in the holes of the lamp socket. Place the foam gasket (6) at the ends of the screws so that it can be placed as a whole on the mounting flange.

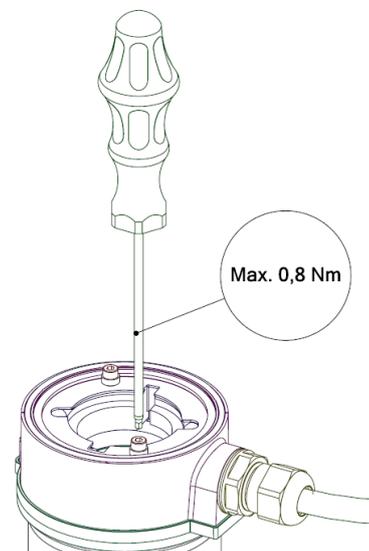
Position the cable (cable gland) (5) in the direction of the water flow (see also chapter 'Installation drawings'), until the screws fall into the holes of the mounting flange (8).

The lamp socket (4) with foam gasket (6) can be secured by means of the supplied M4x45 screws and spacers (2 and 2a).

If the O-ring (3) has been taken out of the lamp socket, it can now be put back clean again. Check the O-ring and groove for contamination. If dirty, clean thoroughly with a brush or dry cloth.



Use only the original screws. These are provided with a special coating to prevent "solid eating" from stainless steel to stainless steel. Use a screwdriver with an adjustable torque (Nm) at all times. Also called torque screwdriver/key. Screw the screws into the mounting flange by hand. Do not screw in the screws by machine! It must be easy to screw in the screws. If this is not the case, check the thread for dirt or damage. Tighten the screws evenly using the torque screwdriver, with a maximum force of 0.8 Nm. (see drawing 29)



Drawing 29

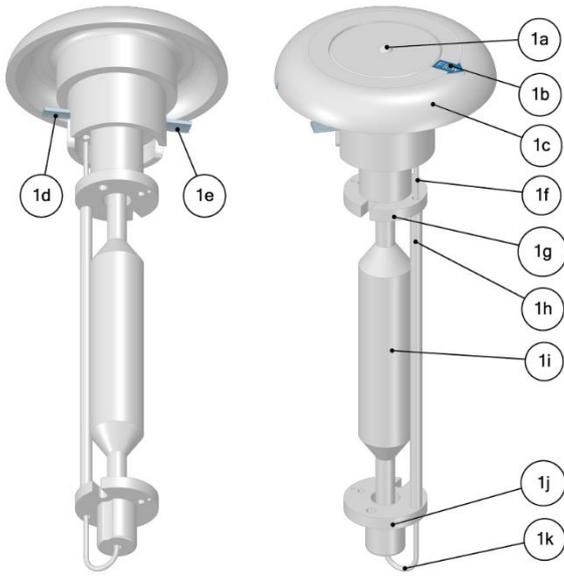
## 6.7 Lamp installation

The lamp consists of a ceramic base, with the lamp attached to it. Together they form a lamp unit, which is placed in the UV-C system without tools.



Touching the quartz glass is not permitted and not necessary for placing the UV lamp. If fingerprints or dirt are present on the quartz parts, the UV-C radiation is negatively influenced, so that the UV-C treatment process is also negatively affected.

1a	Visible light window, to indicate the lamp operation. Window does not transmit UV-C radiation
1b	Arrow for the water flow direction. Ensure that this arrow always corresponds to the flow direction
1c	Ceramic lamp base
1d	Lamp contact small
1e	Lamp contact large
1f, 1k	Return wire (lamp power supply)
1g, 1j	Ceramic lamp spacer/temperature stabilizer
1h	Glass return wire stabilizer
1i	Lamp quartz tube



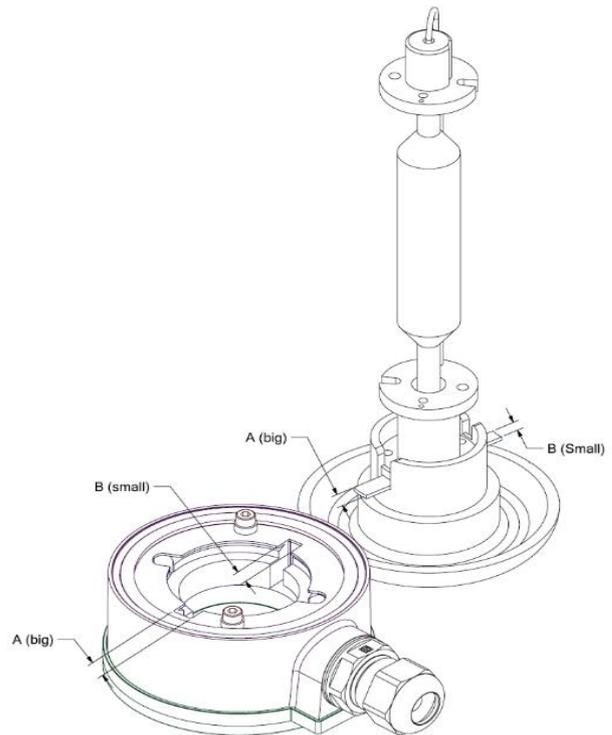
Drawing 39

### Placement of the UV lamp

Grasp the lamp by the base (1c) and guide it with the spacer (1j) through the lamp socket (4, drawing 2, chapter 'Lamp socket assembly') into the quartz tube (11, drawing 2, chapter 'Lamp socket assembly').

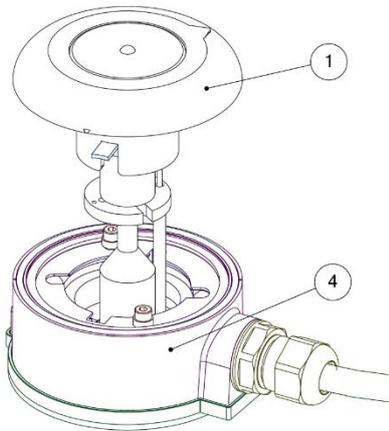


Due to the difference in size in the lamp contacts (1d and 1e), the lamp only fits into the socket in one way. Make sure that the contacts match the openings in the socket (see also drawing 10).

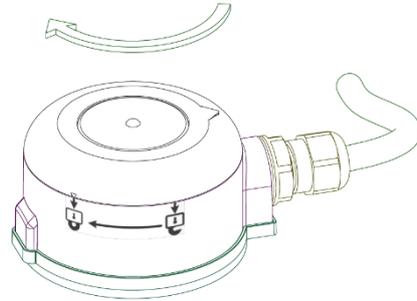


Drawing 10

If the lamp is fully inserted and the ceramic base touches to the O-ring all around (3, drawing 2, 'Lamp socket assembly' chapter), the lamp be secured via the "bayonet closure". Turn the lamp clockwise until it stops. There is an embossed arrow on two sides on the edge of the ceramic base. With correct locking, the arrow corresponds to the closed lock on the socket. (see drawing 12).



Drawing 11



Drawing 12



Ensure that the UV lamp is always in the closed position (arrow on the lamp base matches the position of the closed lock on the lamp socket) before switching on the UV lamp.

## 6.8 Electrical installation



Making changes to the UV system is not permitted.



For the installation of the UV system and therefore also the control system, follow the guidelines described in the chapter 'Environmental conditions'.



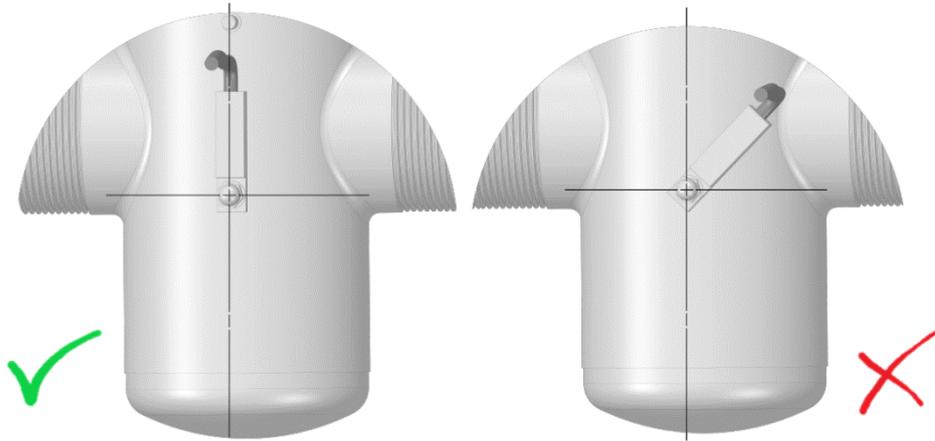
Also follow the instruction as described in the 'Safety instructions' chapter to work safely.



Ensure that the grounding cable, which is already connected to the control, is connected to the relevant and marked ground wire end on the irradiation chamber before the UV system is put into use. Check whether the irradiation chamber has a good electrical connection with the ground contact in the plug.

The UV system is supplied with a permanently connected power cord with plug, this must be connected to a wall socket with protective ground. For this, also follow the mains voltage specifications as specified in the 'Mains voltage' chapter.

Before commissioning, for safe operation of the UV system, the Bimetal switch must also be correctly mounted on the irradiation chamber with the supplied cap nut as shown in drawing 48.



Drawing 48

Correct assembly

Wrong assembly

## 7 Starting up a VGE Pro UV system



Only by VGE International B.V. trained and authorized persons may commission a UV system.



### **Danger of injury and damage to the UV unit!**

The UV unit may only be switched on if the lamp is mounted, the bimetal switch is mounted on the irradiation chamber, the irradiation chamber is grounded, the UV irradiation chamber is correctly and professionally incorporated in a piping system, the UV irradiation chamber is completely filled with water enough water flows through the irradiation chamber. The control panel must also be connected to a socket with grounding.

### 7.1 Mains voltage

The VGE Pro UV unit is designed to operate at a supply voltage of 230 Vac, 50/60 Hz.

Supply voltage limits:

- Minimum 180 Vac
- Maximum 264 Vac

Mains frequency:

- At least 47 Hz
- Maximum 63 Hz



Ensure that both the irradiation chamber and the control box are properly electrically grounded before the UV unit is switched on.



Before switching on the UV unit, check whether the connected mains voltage meets the above specifications, if the minimum limits are exceeded or the maximum limits are exceeded, serious damage to the UV unit will occur.

The mains voltage must be connected directly to the main switch.

### 7.2 Water in the system

Before switching on the UV lamp, the irradiation chamber must be completely filled with water and continuously flow through with sufficient capacity!

An irradiation chamber fully or partially filled with air can become very hot locally after the UV lamp has been switched on, which can damage the UV installation and the environment of the UV installation. There is also a risk of injury to operating personnel.

The water that flows through the UV system may have a temperature between +1 °C and +60 °C. A bimetallic switch is mounted on the irradiation chamber as protection, which switches off the UV lamp(s) at a maximum chamber temperature of approximately +60 °C.

The irradiation chamber can work with a maximum operating pressure of the water of 10 bar, water hammer can irreversibly damage the irradiation chamber or parts thereof.

## 7.3 Cooling of the UV system

The entire lamp power is eventually converted to heat, which means that the irradiation chamber must always be completely filled when the UV lamps are in operation and that there must be a minimum flow to realize sufficient cooling to prevent overheating.

Quantity of cooling water (for a temperature increase of 10 °C in the water, a flow of 100 l/h per kW is required):

- Minimum flow with 1 x 400 W lamp = 0.04 m<sup>3</sup>/h;
- Minimum flow with 1 x 600 W lamp = 0.06 m<sup>3</sup>/h;
- Minimum flow with 2 x 600 W lamp = 0.12 m<sup>3</sup>/h.



If the UV system is included in a circulation process, it must be taken into account that the water is heated when the UV lamp is running. If the process cannot dissipate sufficient heat, a dangerously high water temperature can be achieved and additional protection/cooling must be provided.

The irradiation chamber temperature is monitored by a bimetallic switch that switches off the UV lamp at approximately +60 °C outside chamber temperature.



Above a temperature of ± 42 °C damage to the skin occurs after a while. The higher the temperature, the faster this damage will occur.



**Attention!**

With small water volumes, such as whirlpools or spa's, the heat from the UV lamp(s) can heat up the water to a higher temperature than the setpoint temperature of the concerning whirlpool or spa. In a situation such as a whirlpool, spa or other water basin where a high temperature can cause a risk of personal injury or material damage, the use of an additional temperature protection is obligated! The interlock connector (E) of the control panel can be used for this.

For your safety: This product should be preferably be installed by a professional service technician, qualified in hydrotherapy bath installation.

In case the UV system is controlled by a "Comfort" control panel and the optional Pt100 temperature sensor is installed and connected to the irradiation chamber and the control panel and this function is activated in the control panel, the UV lamp will be switched off standard at +45 °C outside chamber temperature.

## 7.4 Start-up procedure

If the UV system is completely mechanically, hydraulically and electrically installed, the UV system can be put into operation according to the instructions in the table below.

Nr.	Task description
1	Fill the piping system and the irradiation chamber complete with water, making sure that the system and the irradiation chamber are completely vented.
2	Measure the supply voltage and check whether it corresponds to the specification on the type plate.
3	Make sure that water flows through the irradiation chamber.
4	Plug in the power cord.
5	Ensure that the connector is placed with the wire bridge or with the flow switch connection.
6	If the supply voltage and the connector with wire bridge (or active flow switch) are present, a built-in time relay will become active and <b>the lamp will switch on after approximately 10 minutes.</b>
7	Wait until the waiting time and the warm-up time have elapsed (max. 3 minutes) and check at the lamp socket if the lamp is burning.
8	Instruct the servant staff.

## 8 Maintenance

The correct functioning of a VGE Pro UV system is only guaranteed if original spare parts and components are used as described in this manual. The parts described must also be inspected, replaced or cleaned in a timely manner. If instructions are not followed, there is a risk of malfunction or damage to the UV system. If non-original spare parts and components are used or if the inspection, replacement or cleaning is not carried out in time, the warranty on the entire UV system will lapse.



The safety instructions in this manual must be followed at all times, but they do not affect the local and/or legally applicable safety measures and instructions.



UV-C radiation can damage the retina of your eyes and unprotected skin. Ensure that you are not directly or indirectly exposed to UV radiation. Everyone involved must be informed about the specific hazards associated with a VGE Pro UV system.



Installation, maintenance and service work must be carried out by VGE International B.V. trained and authorized persons.



Grasp all quartz glass parts only with clean gloves on, which do not leave any residues or prints (included). If fingerprints or dirt are present on the quartz parts, the UV-C radiation is negatively influenced, so that the UV-C treatment process is also negatively affected.



Quartz can cause serious cuts in the event of breakage.

General steps of maintenance:

1. Switch off the UV system and lock the main switch;
2. Shut off the hydraulic supply and discharge for the UV system;
3. Drain the water from the unit;
4. Perform the specific maintenance as described in this chapter;
5. Remove the lock on the main switch and switch on the UV system in accordance with the conditions described in the chapter 'Water in the system';
6. Check whether the UV lamp is burning.

All adjustments, actions and controls must be documented in the logbook.

## 8.1 Who can perform which actions?

Trained and authorized technical personnel means:

- Service: personnel who have received training and / or instruction from VGE International B.V. or an authorized service partner;
- Maintenance: VGE International B.V. service employee or technical staff trained and authorized by VGE International B.V. ;
- Electrical work: authorized and qualified electrician.

The following activities fall under operation:

- Operating the control.

The following activities fall under maintenance:

- Assembly UV-C system;
- Cleaning and / or replacing quartz glass;
- Replace UV lamp;
- General maintenance of the UV system;
- Exchange O-rings;
- Inspection work.

The following activities fall under Electro:

- All electrical work on the irradiation chamber and in the control.

## 8.2 Maintenance schedule

The maintenance schedule specified below can be used in regular processes. Based on the application, the interval period of inspection, cleaning and / or replacement must be increased or decreased.

It is important that a responsible person and a user are designated and described.



Record all activity carried out on a UV system in the logbook of the relevant UV system.

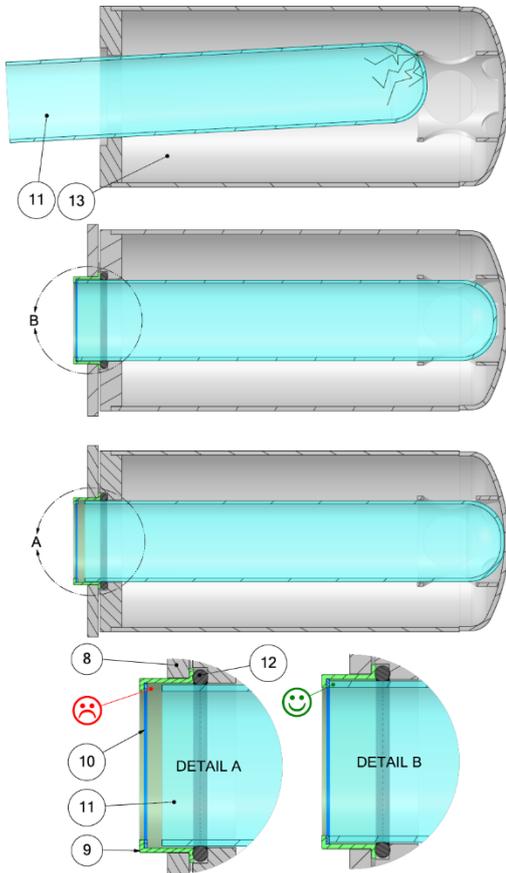
Point of time	Service-level	Activity
Daily	1	- Functional check: - Is the UV lamp working; - Checking for leaks; - The irradiation chamber is completely filled with water.
Monthly	1	- Also perform the daily activities; - Test the systems that are on standby by fully switching them on for at least one hour with water flow.
Annually	2	- Also perform the monthly activities; - Clean the quartz tube and replace if necessary;
3-yearly	2	- Replace the quartz tube.
5-yearly	2	- Have the fan replaced in the control panel.

Maintenance level 1 can be performed by operated personnel.

Maintenance level 2 must be performed by technical staff trained and authorized by VGE International B.V. authorized service personnel.

Periodic maintenance extends the life of the device. Non-timely or non-maintenance of the system limits the service life of a number of components and the operation can no longer be guaranteed.

## 8.3 Quartz tube assembly



Drawing 4

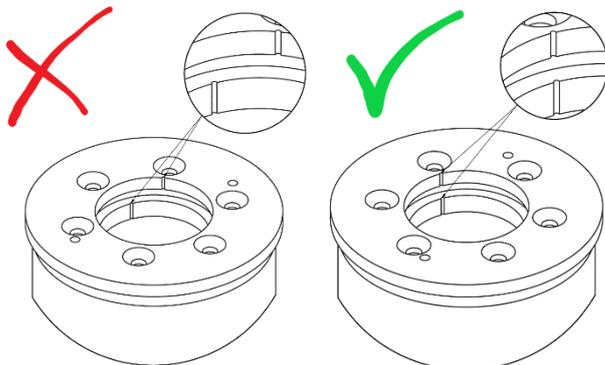
Remove the quartz tube (11) from the packaging and carefully check it for damage. Damaged quartz tubes cannot be used due to the risk of leakage and / or short circuit.

At the end of the irradiation chamber there is a "quartz tube support". Carefully slide the quartz tube into this support, without bumping it into the edge. This could cause a break in the quartz tube. (see drawing 4)

Carefully place the quartz tube (11) in the irradiation chamber (13) until it protrudes approximately two centimetres.

Slide the O-ring (12) over the quartz tube into the O-ring groove. Do not use grease, silicone or other means to lubricate the O-ring or to facilitate assembly. This is not necessary, it can damage the O-ring and moreover it leaves UV-C impervious pollution on the quartz glass. The O-ring forms the watertight connection between the quartz tube and the irradiation chamber.

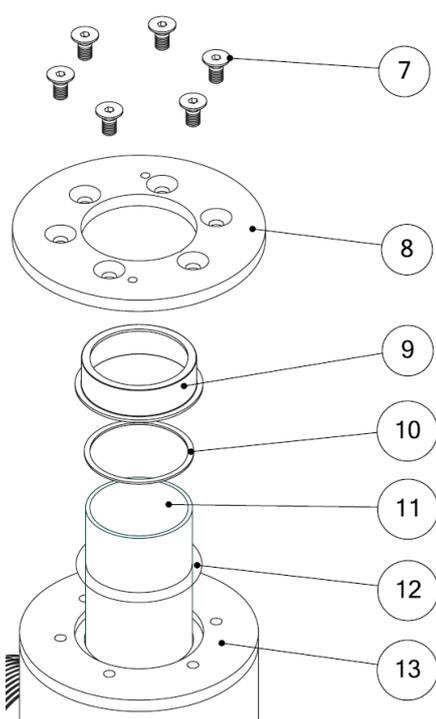
Now place gasket (10) in the aluminium bush (9) and slide the bush with gasket over the quartz tube (11). The gasket (10) provides a protective layer between the quartz tube and the aluminium. The aluminium bushing can now be pushed over the quartz tube together with the gasket to the O-ring and irradiation chamber. The edge of the quartz tube (11) should touch the gasket (10) when everything is in the right place. (see figure 4)



Drawing 5

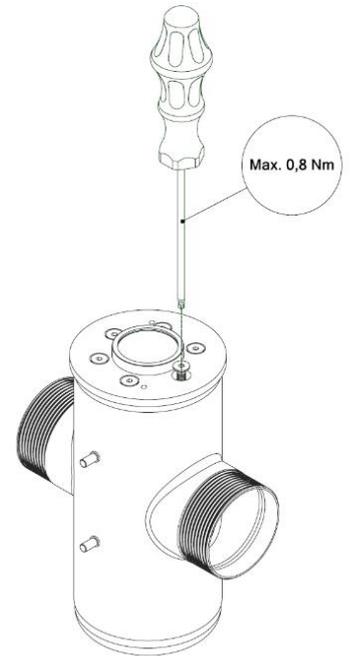
Drawing 6

The mounting flange (8) can now be positioned with respect to the hole pattern on the irradiation chamber (13). The mounting flange can only be positioned in one way. To simplify correct positioning, markings have been applied to the irradiation chamber and to the mounting flange. (see drawings 5 and 6) When the markings are in line, the holes correspond.



Drawing 26

The mounting flange can be fixed by means of the included M5x10 bolts (7).

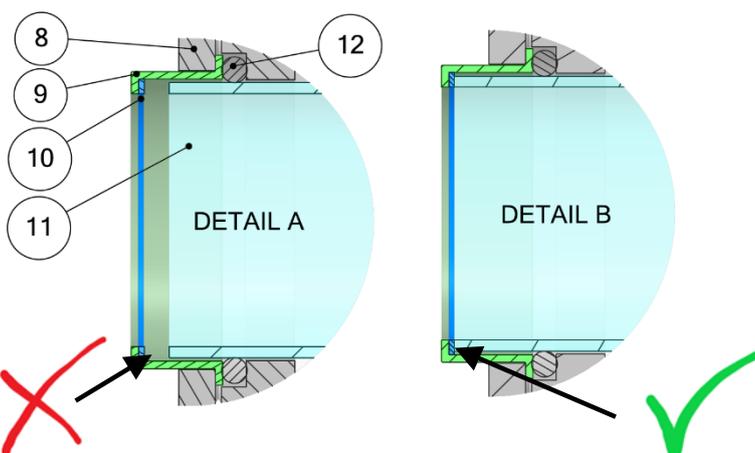


Drawing 27



Use only the original screws. These are provided with a special coating to prevent high friction from stainless steel to stainless steel. The coating prevents the screws from blocking. Use a screwdriver with an adjustable torque (Nm) at all times. Also called torque screwdriver/key. Loosely screw in the screws by hand. Tighten the screws using the torque screwdriver crosswise, with a maximum force of 0.8 Nm (see drawing 27).

**Do not screw in the screws by machine! It must be easy to screw in the screws.**



Drawing 4

Check again if the gasket (10) is locked in by the quartz tube (11) and aluminium sleeve (9). Check the quartz tube again for damage.

## 8.4 Lamp replacement

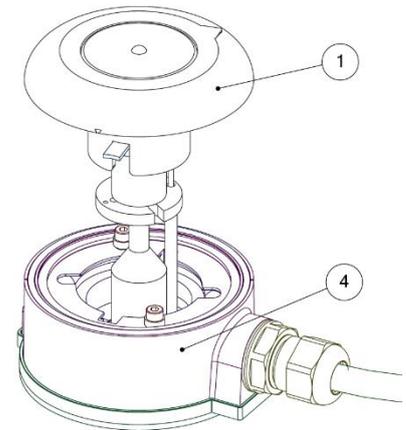
Because UV lamps age slowly as a result of use, with the result that the amount of UV energy produced decreases (the visible light remains practically the same), the dosage in the water to be treated decreases and must be replaced periodically. A UV lamp must also be replaced if it has defects or is defective.

1. Switch off the UV system and lock the main switch;
2. Wait at least 15 minutes until the UV lamp has cooled down sufficiently;



When handling a UV lamp, always wear the gloves supplied with the UV system.

3. Disconnect the lamp by turning it counter clockwise and gently pulling it out of the irradiation chamber;
4. Remove the O-ring (3) on the socket (4);
5. Place the new O-ring (3) (supplied with the lamp) in the socket (4);

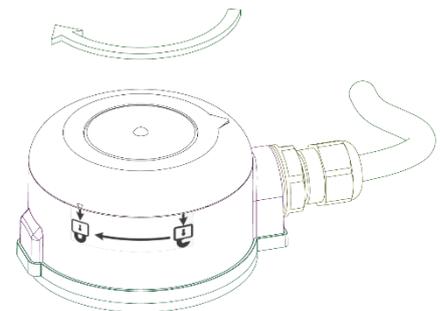


Drawing 11



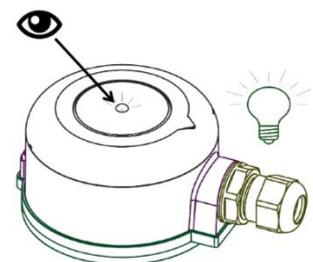
When replacing, always use the supplied components such as O-rings and gaskets.

6. Remove the new UV lamp from the packaging, note: the UV lamp is very fragile;
7. Place the new UV lamp (1) in the socket (4) (see chapter 'Lamp installation' for correct positioning). And turn it clockwise until the arrow is at the height of the lock (drawing 12);
8. Store the old UV lamp in the packaging of the new UV lamp;



Drawing 12

9. Remove the lock on the main switch and switch on the UV system in accordance with the conditions described in the chapter 'Water in the system';
10. Check if the lamp (1) is on (drawing 23a);
11. Dispose of the old one in compliance with local rules and laws. See also chapter 'UV lamp disposal'.



Drawing 23a

## 8.5 Lamp breakage

Also read the chapters 'UV lamp breakage' and 'Quartz tube breakage' where causes and warnings are described.

If a UV lamp is defective or broken but the quartz tube is not defective, do the following:

1. Switch off the UV system;
2. Shut off the power supply to the UV system;



8.5.1.1.1.1 Warning! Broken quartz is sharp. Use the correct protective equipment. (The gloves supplied do not protect against cutting). Check the total system for quartz fragments and take the right measures against this.

3. Remove the UV lamp (residues) from the irradiation chamber;
4. Collect any mercury released and dispose of appropriately;
5. If all remnants have been removed, a new lamp can be placed;
6. Switch on the UV system and ensure that the irradiation chamber is flowed through with sufficient water (see chapter 'Cooling the UV system');
7. Check whether the UV lamp is burning.

In the case of a broken quartz tube, the instructions in the 'Broken quartz tube' section must also be followed.

## 8.6 UV Lamp disposal

Used UV lamps must be disposed according the local regulations and laws.

In an effort to provide a safe and efficient way to dispose of VGE Pro UV lamps, used and defective VGE Pro UV lamps can also be sent to VGE International B.V..

We ensure correct processing under to the following conditions:

- Only VGE Pro UV lamps are accepted;
- The UV lamps that are returned must be packed and returned to VGE International B.V. in the same way as originally sent to the customer;
- The lamps to be returned must be clearly visible marked with description, number and sender;
- The costs for returning VGE Pro UV lamps are for the sender;
- Any administrative actions with regard to, for example, cross-border transports, must be handled entirely by the sender;
- UV lamps must be sent to VGE International B.V..

Return address for used and defective VGE Pro UV lamps:

VGE International B.V.

Ekkersrijt 4304

5692DH Son

Netherlands

## 8.7 Decommissioning

If the UV system is not used for a longer period of time (more than two weeks), it must be switched off completely.

Concerns	Required work
Control panel	Switch off the main switch on the control panel of the UV system and lock it with a lockable lock
Irradiation chamber	Close the water supply and drain of the UV irradiation chamber
	Empty the irradiation chamber
	Clean the irradiation chamber internally
	Rinse the irradiation chamber with clean water
	Remove all water residues from the irradiation chamber

## 8.8 Problem solving

If malfunctions occur during the water treatment process with the UV system, the overview below can be used to determine and resolve the cause of the malfunction or problem.

Problem	Possible cause	Solution
Lamp is not burning. Indicator on control panel does not light up.	Plug not in the socket.	Insert the plug into a working socket.
	No supply voltage.	Provide power supply.
	Waiting time of 10 minutes has not yet expired.	After start command for lamp to wait 10 minutes.
	Fuse defective.	Replace defective fuse.
	Connector (E) with internal bridge not present.	Insert connector (E) with through connection.
	No flow switch or remote contact active that is connected to connector (E).	Ensure sufficient flow if a flow switch is used or activate remote contact.
Lamp does not start. Indicator on control panel lights green.	Lamp not properly placed in lamp socket.	Make sure the marking on the lamp base is positioned opposite the closed lock symbol on the lamp socket.
	Lamp defective.	Place a new lamp or check the lamp with a lamp tester.
	Lamp power supply or control panel defective.	Replace the control box
Irradiation chamber becomes too hot.	No water in the irradiation chamber or not completely filled.	Fill the system completely with water and ensure sufficient flow.
	Water "pours" out of the pipe after the irradiation chamber, creating an air containment.	Ensure there is sufficient back pressure or flow through the irradiation chamber from the bottom up.
	No or insufficient flow of the irradiation chamber.	Ensure adequate flow through the irradiation chamber.
Control panel becomes too hot.	The ambient temperature is higher than 40 °C.	Ensure that the ambient temperature remains below 40 °C.
	Control cabinet hangs in sunlight.	Reposition the control so that it can no longer be irradiated by sunlight or ensure suitable sun protection.
	Control panel hangs too close or against a heat source.	Move the control panel to a cool place.
Lamp switches off after a certain time.	Irradiation chamber becomes too hot so that the thermal protection switches the lamp off.	See 'Irradiation chamber getting warm'.
	The control panel becomes too hot, so that the thermal protection switches the lamp off.	See 'Control box becomes warm'.
	Internal fan is defective (no more noise in the control box).	Replace the control panel.

<b>Problem</b>	<b>Possible cause</b>	<b>Solution</b>
Water comes out of the irradiation chamber.	Damaged or incorrectly positioned O-ring that seals the quartz tube.	Replace O-ring.
	Damaged or broken quartz tube.	Replace quartz tube.
Effect UV system is not good, not enough reduction bound chlorine.	The UV transmission of the water is too low.	Improve the UV transmission of the water or select another (more powerful) UV system.
	The flow rate is too high.	Reduce the flow or select another (more powerful) UV system.
	Polluted quartz tube	Clean or replace the quartz tube.
	UV lamp has too many operating hours	Replace UV lamp and reset Timer.
	UV lamp defective	Replace UV lamp and reset Timer.
	Control panel defective	Replace control panel.
	Incorrect sampling.	Ensure that the measuring equipment is properly calibrated and perform the measurement again in accordance with the applicable rules.
	Possibly an overload of the bath.	Wait until the UV system has done its work, reduce the number of visitors or select a more powerful UV system.
Effect UV system is not good, not enough disinfection.	The UV transmission of the water is too low.	Improve the UV transmission of the water or select another (more powerful) UV system.
	The flow rate is too high.	Reduce the flow or select another (more powerful) UV system.
	Polluted quartz tube	Clean or replace the quartz tube.
	UV lamp has too many operating hours	Replace UV lamp and reset Timer.
	UV lamp defective	Replace UV lamp and reset Timer.
	Control panel defective	Replace control panel.
	Incorrect sampling.	Ensure that the sampling points are properly disinfected before taking the water samples and repeat the measurement.
Indicator on control box flashes green.	Lamp almost needs to be replaced (indicator flashes during the last 500 hours).	Make sure you have a spare lamp on hand.
Indicator on control box lights up red.	Lamp must be replaced immediately, end of life is reached.	Replace UV lamp and reset Timer.

## 8.9 Logbook

Complete this document and ensure that this document is physically placed with the device.

UV-system	
Serial number	
Date of installation	
Date of purchase	
Responsible user	
Main user	

The following items must be described in the logbook.

- Date of incident/check/serve;
- Reason for action/malfunction/maintenance;
- Work performed, comments;
- Operational hours;
- On/off switches;
- Flow rate;
- Water transmittance;
- UV intensity (if a UV sensor is present).



## 9 Spare parts and maintenance schedule

### 9.1 Spare parts

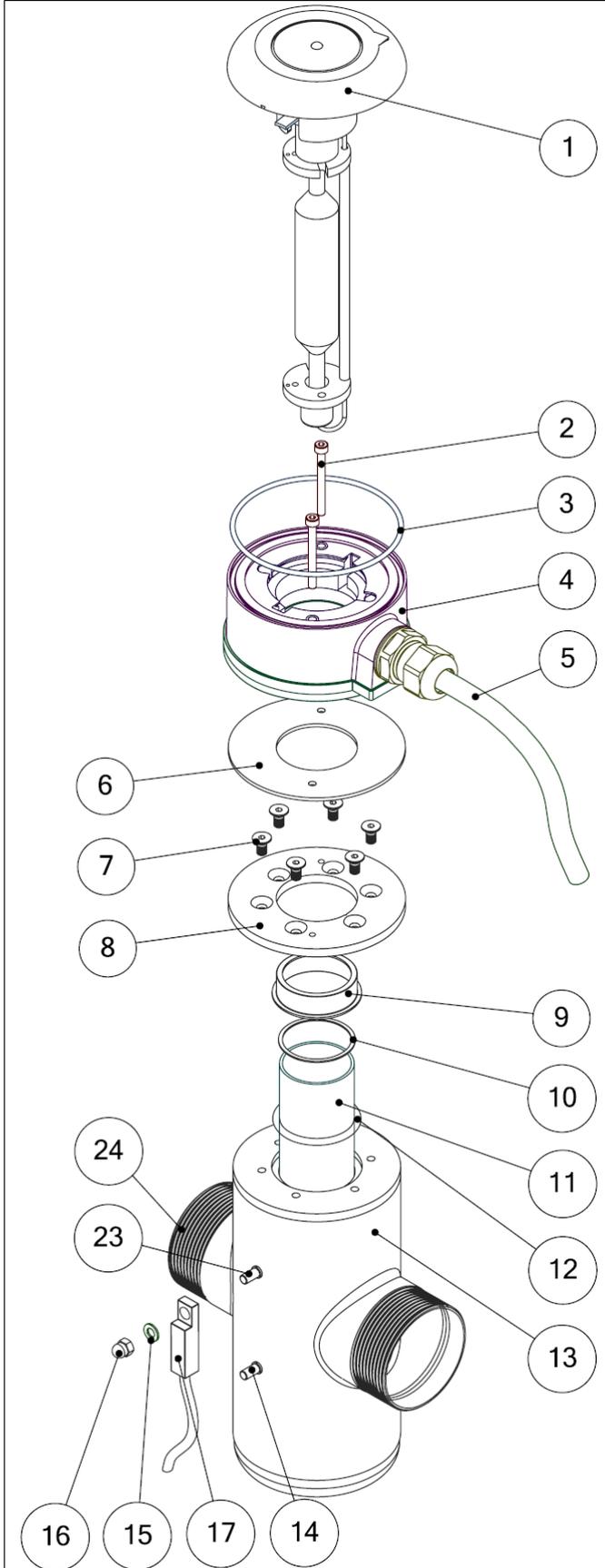


For safety reasons only use original spare parts. Contact your supplier's customer service if you need spare parts.

Register all changes and tasks performed in the logbook, an example of a logbook is attached in this manual.

The item numbers in the material lists correspond to the numbers in the exploded view of the relevant item.

## 9.2 Spare parts MultiMax



Drawing 25

Item	Number	Art. number	Description
1	1	F980500	Lamp VGE Pro MP 400 W
2	2	F990898	Screw M4 x 40 mm A2 RVS DIN 912
3	1	3902150	O-ring 83 x 2.5 mm
4	1	F990303	MP lamp socket
5	1	F990068	MP lamp cable 18AWG SOW 2C 600 V/10 A 105 °C
6	1	3902170	Foam gasket EPDM clamping flange MP
7	6	F990899	Countersunk Allen screw M5 x 10 mm Stainless steel A2 DIN 7991
8	1	B212195	Clamping flange housing MP
9	1	B299616	Quartz tube locking MP 38 mm
10	1	3902172	Quartz tube protection ring EPDM 39 x 35 x 1 mm
11	1	QG100	Quartz tube 38 x 1.5 x 195 mm
12	1	3902174	O-ring EPDM 37.69 x 3.53 mm AS568-222
13	1	VIM00401H	Irradiation chamber VGE Pro MultiMax
15	1	4800040	Washer A2 M5
16	1	E831400	High cap nut M5 DIN 1587
17	1	B290146	Bimetallic switch 60 °C incl. 10mtr cable

## 9.3 Spare parts sets

Service set:

This set consists out of the following parts:

- O-ring for lamp socket/socket;
- Foam gasket for socket/RVS flange;
- Quartz tube protection ring;
- O-ring for sealing quartz tube/SS flange;
- O-ring for UV sensor/SS plug;
- Screws for mounting clamping flanges.

The following parts are available:

- UV-lamp;
- Quartz tube.

UV-Lamp

This set consists out of the following parts:

- UV-lamp;
- O-ring for lamp socket/socket.

Quartz tube:

This set consists out of the following parts:

- Quartz tube;
- Service set.

Bimetallic switch:

This set consists out of the following parts:

- Bimetallic switch 60°C with 10 m cable;
- Cap nuts;
- Washers.

Description	Spare parts VGE Pro MultiMax
Type	MultiMax
Service set	SP0054
Quartz tube	QG101
400 W UV-Lamp	F980500
Bimetallic switch 60 °C	B290146

## 9.4 Consumable parts

The following items fall under consumable parts:

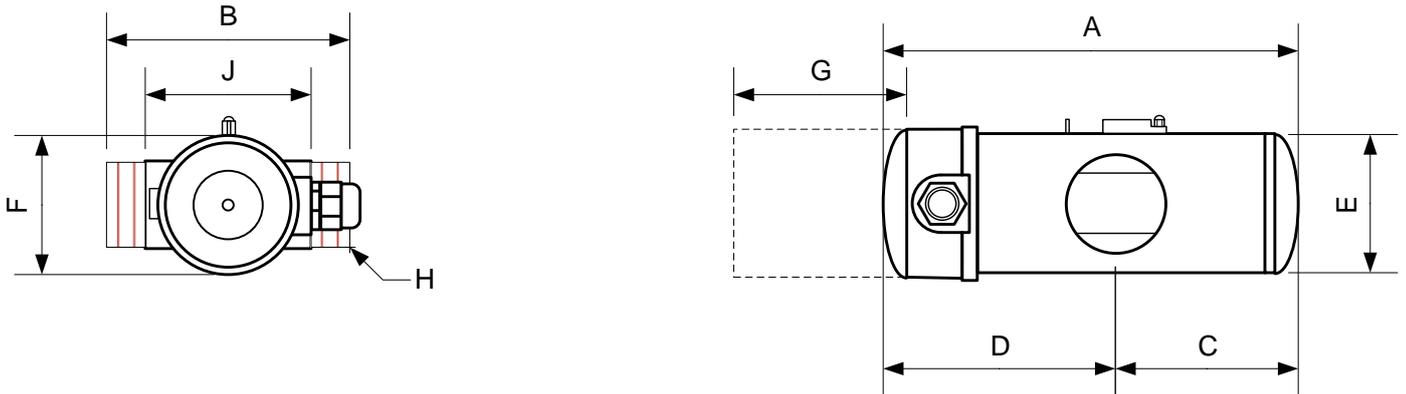
- UV lamp + mounting attributes;
- Quartz tube + mounting attributes.

Follow the instructions as described in this manual for replacing these consumable parts.

## 10 Drawings

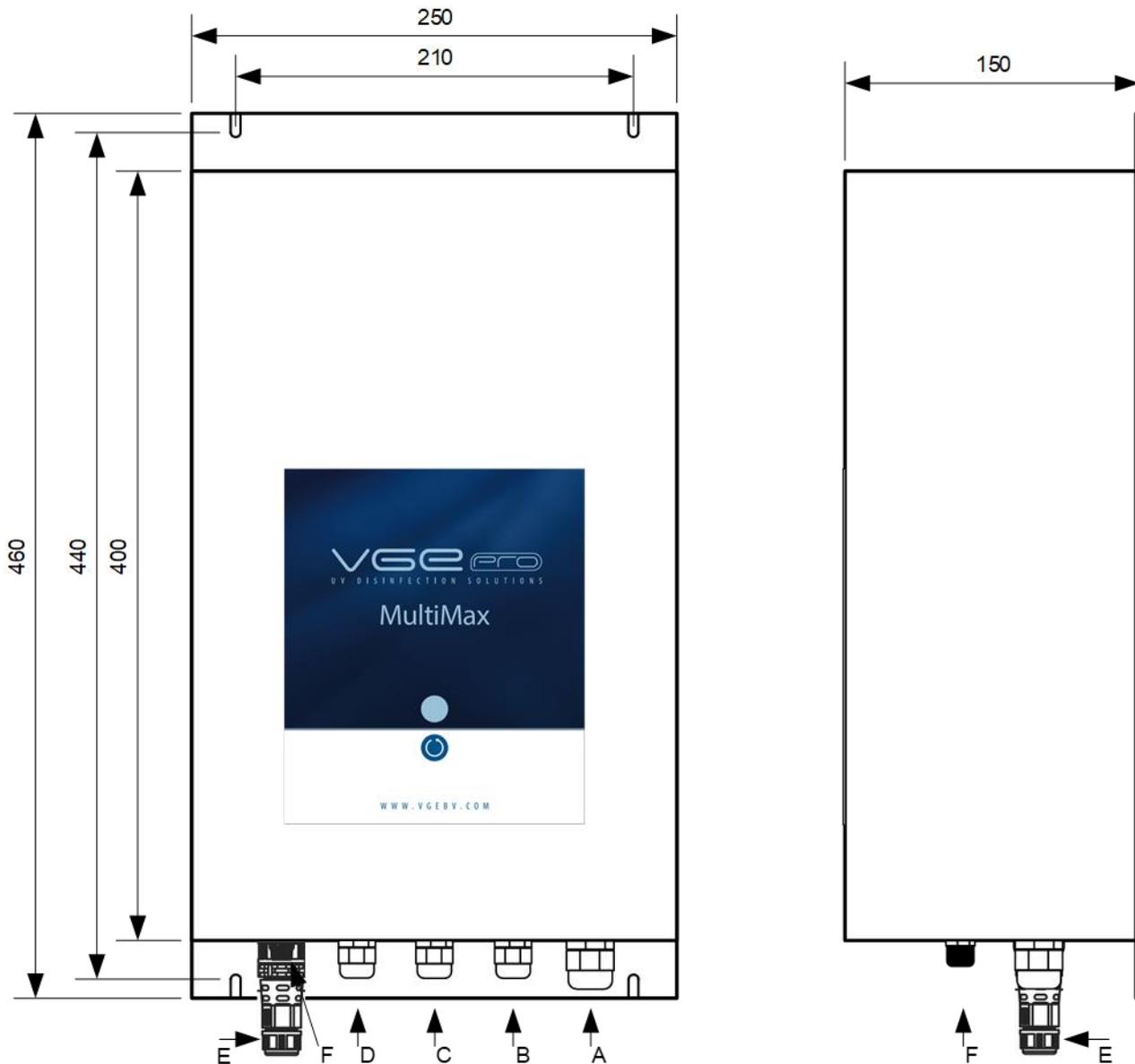
### 10.1 Dimensions

### 10.2 Irradiation chamber, dimensions



VGE Pro MD						Dimensions									
Type	Shape	Maximum working pressure [bar]	Connection	Weight dry [kg]	Weight wet [kg]	A	B	C	D	E	F	G	H	I	J
											[mm]				
MultiMax	Inline	10	2" male	2	3	250	156	115	135	85	91	230	2"	-	86

10.3 Control panel, dimensions



- A = Lamp cable
- B = Earth from irradiation chamber
- C = Temperature monitoring on the irradiation chamber
- D = AC power cable
- E = Connector for flow/remote on/off switch, connector with interconnector
- F = Fuse, 10 A

## 11 Certificates and declarations

### 11.1 CE declaration



We, VGE International BV

Ekkersrijt 4304  
5692 DH Son  
The Netherlands

Declare under our responsibility for the product(s):

Product Range:	UV-C radiation water radiation appliances
Product code:	Please refer to attached appendix

The designated product(s) is (are) in conformity with the essential requirements of the following European Directives and harmonized standards:

Low Voltage Directive (LVD), 2006/95/EC, date issue 12 December 2006	
<ul style="list-style-type: none"> <li>EN 60335-1:202</li> <li>EN 60335-2-55:2003</li> <li>EN 60335-2-109:2010</li> </ul>	<ul style="list-style-type: none"> <li>EN 61000-3-2</li> <li>EN 61000-3-3</li> <li>EN 55014-1/2</li> <li>EN 55015-1/2</li> </ul>
Restriction of the use of certain Hazardous Substances in electrical and electronic equipment Directive (RoHS), 2011/65/EU	
<ul style="list-style-type: none"> <li>EN 50581:2012</li> </ul>	

Full compliance with the standards listed below proves the conformity of the designated product with the provisions of the above-mentioned EC Directive:

Signature:	
Name:	Arjan van der Spank
Function:	General Manager
Contact address:	Ekkersrijt 4304 5692 DH Son The Netherlands
Date:	2019-04-15

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**Appendix:** Specific products that includes the CE-declaration

Issue date appendix: 2019-04-16

Product code	Product name
VIM00401	VGE Pro UV MP MultiMax 400
VIM00601	VGE Pro UV MP 600 basic
VIM00602H	VGE Pro UV MP 600
F980500	Lamp VGE Pro MP 400W
F980505	Lamp VGE Pro MP 600W
EPM00401	VGE Pro UV Electrical Part MP MultiMax 400
EPM00601	VGE Pro UV Electrical Part MP Basic 600
EPM00602	VGE Pro UV Control Monitor MP 600

Signature:

