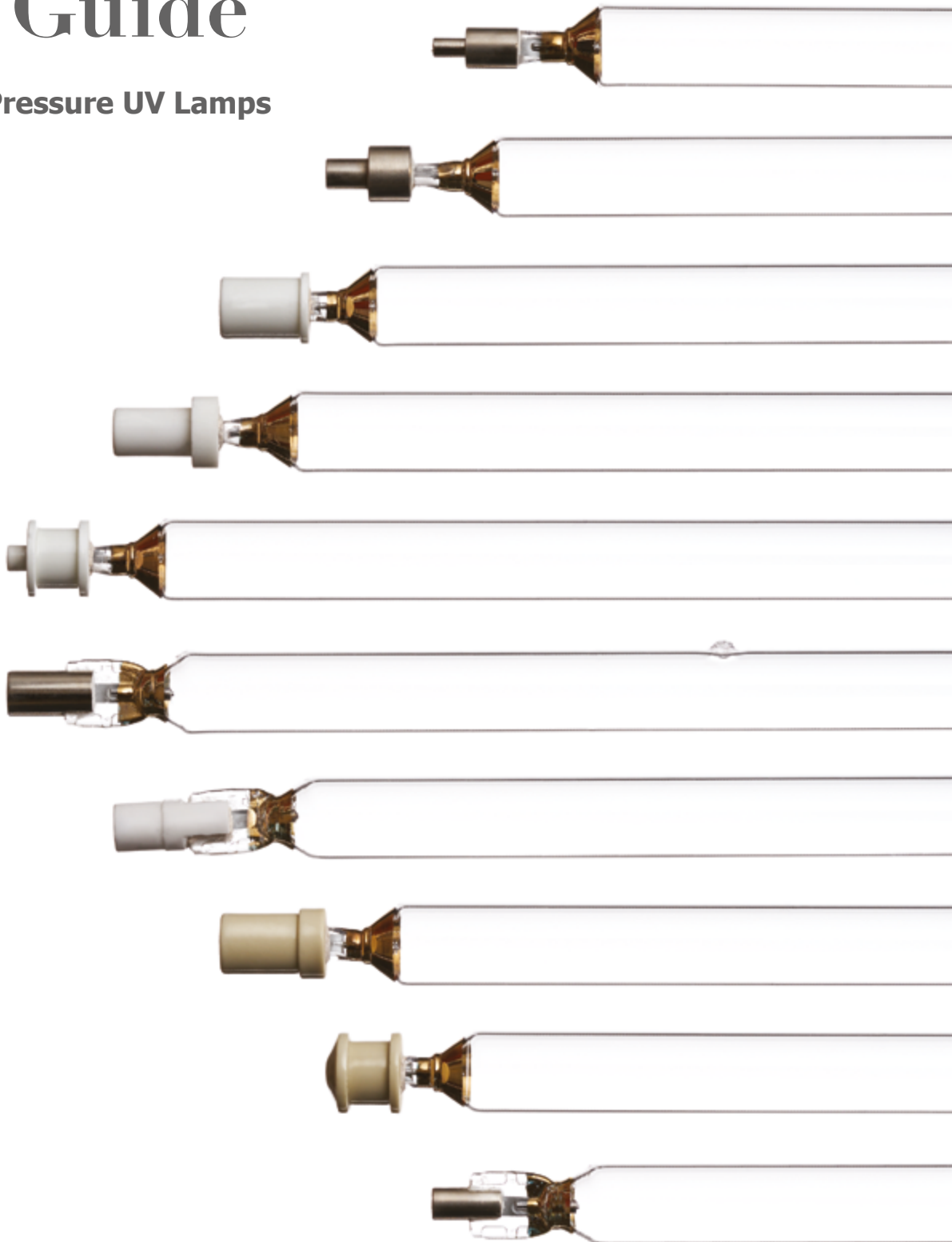




ALPHA-CURE
Specialists in UV Technology

User Guide

UV Medium Pressure UV Lamps



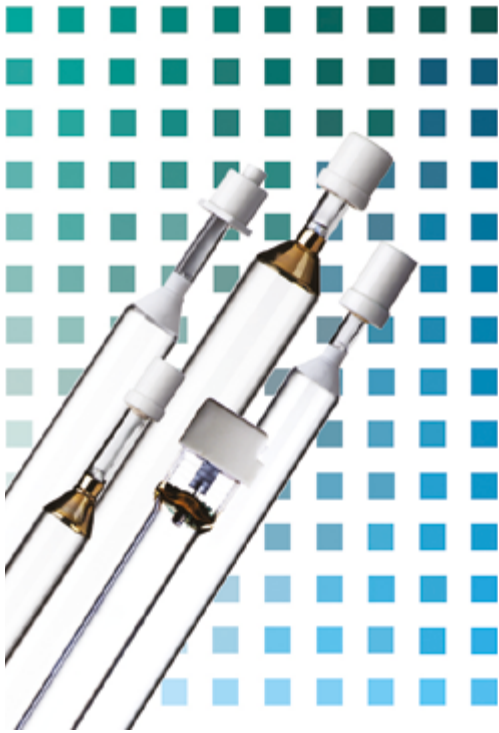


Table of Contents

Alpha-Cure Ltd. Company Information	Page 3
UV Medium-Pressure Lamps: Overview	Page 4
UV Medium-Pressure Lamps: Start-up	Page 6
UV Medium-Pressure Lamps: Operation	Page 6
UV Medium-Pressure Lamps: Turning Off	Page 6
UV Medium-Pressure Lamps: Monitoring	Page 6
UV Medium-Pressure Lamps: Appropriate Use	Page 7
UV Medium-Pressure Lamps: Safety Risks	Page 7
UV Medium-Pressure Lamps: Warranty Claims	Page 8
UV Medium-Pressure Lamps: Safety Markings	Page 9
UV Medium-Pressure Lamps: Returns	Page 10

1. Alpha-Cure Ltd. Company Information

Alpha-Cure is the world's leading manufacturer of medium-pressure UV lamps, offering the widest range of original and replacement UV lamps for all types of systems. Our extensive cross-referenced database of lamp references comprises over 20,000 different specifications for virtually any curing system in the world.

We are proud to manufacture bespoke UV lamp designed to meet our customers' exact requirements. Custom lamps range in power from 80 watts per cm up to 550 watts per cm, and up to 4 metres in arc length. Together with a selection of ceramic and metal end caps and varying lead terminations, our UV lamps can be altered to suit virtually any UV equipment requirements.

Alpha-Cure has decades of experience manufacturing and supplying UV lamps and ensuring customers get the most out of our products. If you would like to find out more about caring for your UV lamps and reflectors or troubleshooting the most common problems with UV lamps, please head to our Knowledge Centre on the Alpha-Cure website.

Whatever your UV requirement, make sure you contact Alpha-Cure today to speak to our experienced sales and technical teams to find out why you should choose Alpha-Cure lamps.

2. UV Medium-Pressure Lamps: Overview

UV medium-pressure lamps feature a broad, pronounced line spectrum in the ultraviolet and visible range (200 nm to 600 nm) with high power densities.

They are suitable for UV oxidation, UV curing, and photochemical processes.

Various additives can be used to adjust our UV medium-pressure lamps to your requirements.

Types of UV medium-pressure lamps:

- Standard UV medium-pressure lamps: high radiation output in the UVA, UVB, and UVC range, for curing applications.
- Ozone reducing UV medium-pressure lamps: reduced UVC output for curing applications with extraction limitation.
- High-performance UV medium-pressure lamps: increased UVC output for oxidation effect.
- Metal halide additives can optimise the spectrums for photochemical applications.

UV medium-pressure lamps are produced as linear lamps as standard. They consist of a sealed discharge tube made of quartz glass. The discharge vessel is filled with noble gases at low pressure and the active materials to optimize the UV radiation.

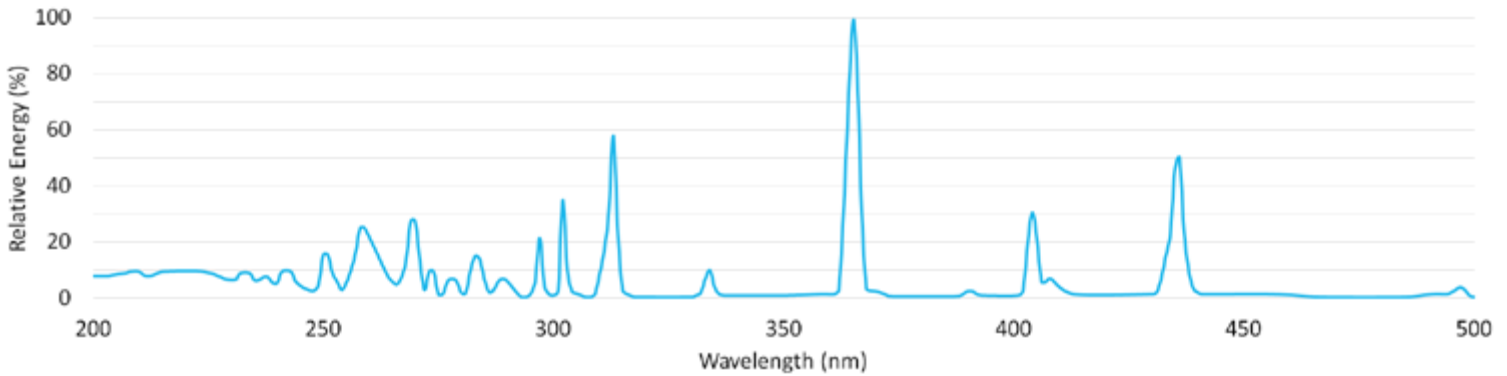
How Do UV Lamps Work?

1. Voltage is applied to the lamp electrodes.
2. The gas inside the lamp is ionized and an electrical arc is generated.
3. Electrical current flows through the lamp, this is limited by the power supply used to protect the lamp and associated circuit.
4. As the lamp temperature rises, chemicals within the lamp change into their gaseous state.
5. The pressure increase in the lamp causes a higher lamp voltage and more power will be consumed.
6. Ultimate lamp power and output depends on the type and amount of materials added to the lamp in combination with the power supply.

The operating environment of UV medium-pressure lamps can influence their performance and should be designed based on the specific operating conditions. UV medium-pressure lamps must always operate on a suitable ballast with the correct cooling.

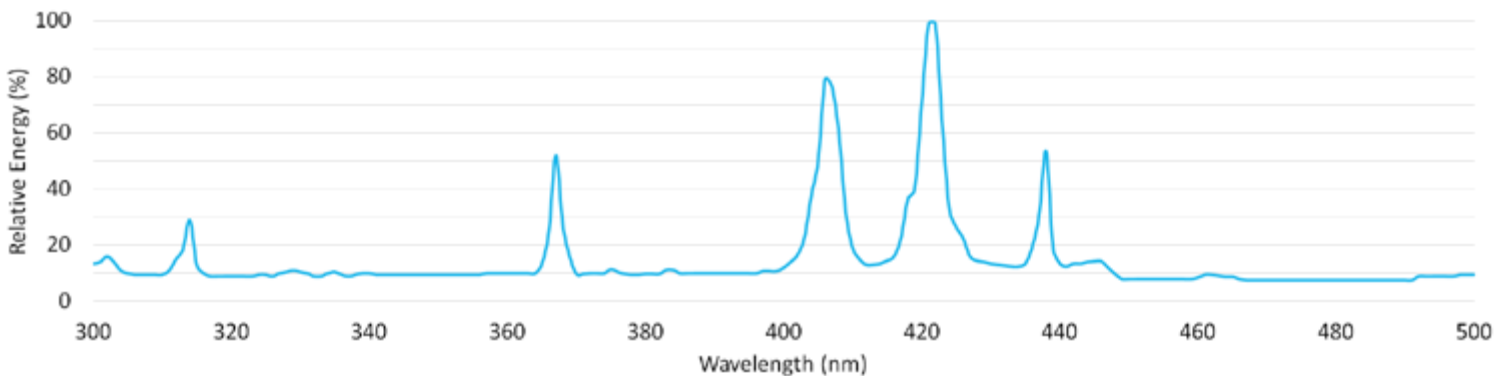
During operation UV medium-pressure lamps emit a discontinuous spectrum called a line spectrum. In such a spectrum, there are separate points of increased intensity, called spectral lines.

Graph 1: Spectral output of a medium-pressure mercury UV lamp.

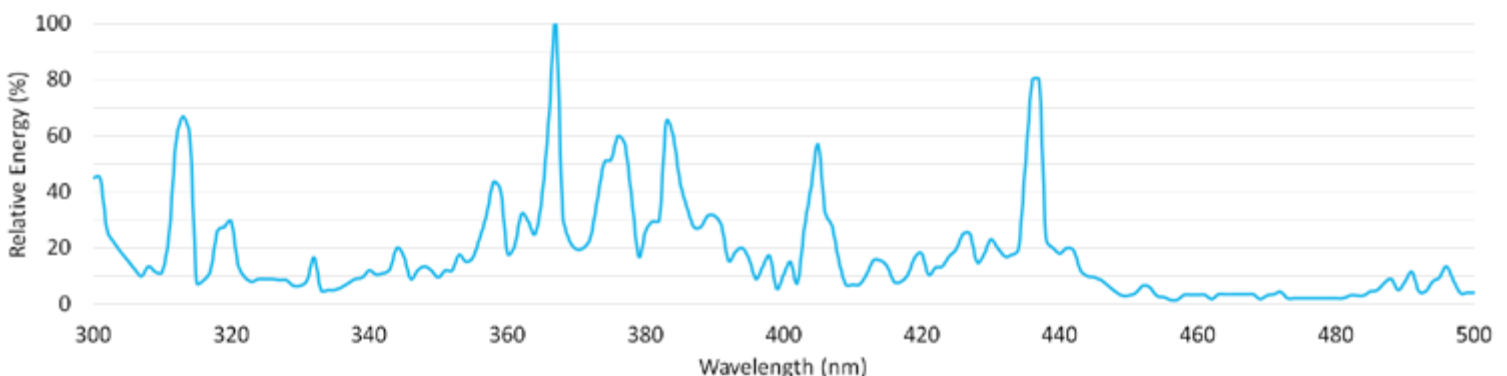


The above spectrum is well suited to many applications: curing of printing ink or varnish. The spectrum of UV medium-pressure lamps can be influenced by doping. Within the scope of physical possibilities, wavelengths can be selectively generated or reduced to adapt the lamps to specific applications.

Graph 2: Spectral output of a medium-pressure gallium-doped UV lamp.



Graph 3: Spectral output of a medium-pressure iron-doped UV lamp.



3. UV Medium-Pressure Lamps: Start-up

The start-up of UV medium-pressure lamps depends on their geometry, length, diameter, temperature, and filling. For example, longer lamps will require a higher ignition voltage. The re-ignition of hot medium-pressure lamps is not possible due to the high internal pressure. Therefore, they should be allowed to cool before re-ignition is attempted.

4. UV Medium-Pressure Lamps: Operation

Once ignited, the flowing lamp current heats the lamp. The volatile materials within the lamp evaporate and disperse into the discharge. In time a steady operating temperature is achieved when the power dissipated, and the cooling are in balance. The running lamp voltage is achieved and with the current controlled by the power supply the power dissipated remains constant.

While in operation, the lamp temperature must be maintained at 700-900°C through regulation of the lamp power and the cooling.

If lamps are operated at a low temperature for a longer period, we recommend heating them to ideal operation temperatures regularly to increase their lifetime. Undercooling causes internal blackening of the lamp, and in extreme cases can lead to the extinction of the arc within the lamp. Overheating of the lamp should also be prevented. This can also lead to blackening and in extreme cases deformation or melting of the lamp body.

Lamps should be operated horizontally wherever possible. In vertical operation there is a critical heat accumulation that makes proper cooling very difficult especially at high power densities.

5. UV Medium-Pressure Lamps: Turning Off

We do not recommend frequent power cycling mainly because of the necessary heat-up time. Each ignition slightly influences the effectiveness of the electrode. The correct matching of the power supply used is critical for the most efficient operation of the lamps.

6. UV Medium-Pressure Lamps: Monitoring

Medium-pressure lamps can be monitored by measuring the UV radiation. This can be linked to electronic ballasts to provide information on the operation as well as measuring the values for voltage, current, and power. By monitoring the operation of the UV medium-pressure lamp, it can be determined whether the UV lamp is working optimally and if the UV output has decreased due to aging.

7. UV Medium-Pressure Lamps: Appropriate Use

- Only an operator with knowledge of the safety regulations should operate the UV lamps.
- Additionally, all relevant in-house health and safety risk assessments must be performed and observed by all persons working with the lamps.
- UV medium-pressure lamps must always be used with an appropriate power supply.
- Alpha-Cure Ltd. will not be liable for damages resulting from using inappropriate ballast.
- Lamps can only be used for the purpose for which they were constructed and in conditions in which their operation complies with all safety requirements.
- All safety devices on the UV system must be tested for correct functioning before operation.
- Look for external signs of damage before using a lamp.
- The electrical components of the power supply and the lamp must be inspected regularly to ensure they are in a safe condition.

8. UV Medium-Pressure Lamps: Safety Risks

Risk of electrical shock:

- Turn off power before inspection, installation, or removal. Use only in luminaire equipped with appropriate interlocking circuits.

Risk of injury:

- Use only with power supplies designed for this product.
- Risk of UV or optical radiation which may cause eye and skin injury [IEC 62471 Risk Group 3].
- If a glass bulb is broken, turn off the power and remove the lamp.
- Use appropriate shielding or eye protection.
- Do not look at the operating lamp.
- Use only in an enclosed luminaire able to contain hot lamp parts, even during testing.
- High ozone-concentrations are harmful to humans and animals.
- Ensure good air ventilation.

Risk of burn:

- Allow the lamp to cool down before handling.
- Do not use the lamp if the glass bulb is broken.
- Replace lamp quickly at the end of its life [marked change in colour, flickering, failure to start].
- Do not handle the lamp with bare hands, and clean with special tissue.
- Avoid skin contact with broken lamp parts.

Safety disposal:

- Dispose of used lamps according to local regulations.

9. UV Medium-Pressure Lamps: Warranty Claims

The Terms and Conditions for the Sale of Goods”, “Material Safety Data Sheets” (MSDS) as well as the warranty regulation terms apply. These are available for the user at the latest since the conclusion of the first contract.

Warranty and liability claims for personal injury or property damage are excluded if the fault is caused by:

- Incorrect assembly and operation of the lamps
- Operation of an unsafe UV system
- Non-adherence to the lamp Material Safety Data Sheet (MSDS) safety instructions
- Non-adherence to this Guide’s safety instructions
- Unauthorised repair or alteration to the construction of a UV lamp
- Catastrophes, the actions of foreign bodies and acts of God
- Damage or defects originating from inappropriate use of the lamp

10. UV Medium-Pressure Lamps: Safety Markings



Medium-pressure lamps contain mercury and used lamps are classified as hazardous waste, which cannot be disposed of in the general waste stream. The lamp is marked with the WEEE symbol and this indicates that they must be disposed of following the WEEE regulations.



This product conforms with the CE Marking Directive and has an EC Declaration of Conformity.



Lamps are encased in a protective sleeve and shipped in ready to use condition. The lamp must never be handled with bare hands. Salts in the skin can attack the quartz and cause a reduction in the lamp's life. Always wear gloves to handle the lamp; however, if the lamp becomes marked, clean with a special wipe before fitting.



Medium-pressure lamps contain small amounts of mercury, which can become a hazard if the lamp is broken outside its protective plastic sleeve. If a lamp is broken, avoid mercury contact with skin and clothes.



Exposure to UV can result in damage to the skin.



UV radiation hazard. Use only with shielding in place. Protect eyes and skin from exposure to UV light. Do not look directly at the light.



The UK Conformity Assessed mark indicates that the product conforms to the UK legislation and has the UK Declaration of Conformity.

11. UV Medium-Pressure Lamps: Returns

To return or to make a claim the UV lamps must be shipped to us. Please contact your account handler to agree and issue returns documentation. Keep the following information ready:

- Lamp type, serial number, packing list number, customer name.
- Operating hours and switching cycles (pictures and documents desirable).
- Power supply used and electrical characteristics.
- Operating conditions, frequency of equipment maintenance, air temperature.
- Lamp pictures for any discoloration or change in shape.
- Dimensions and weights of the package.

You must have a Customer Reject number assigned by your account handler before sending any faulty lamps back to us. Upon arrival, the lamps will be inspected by our technical engineers and we will contact you if consultation is necessary.

