Quartz Halogen/Tungsten Emitters

Short-wave emitters

Dear Customer,

we would like to use this opportunity to thank you for buying this product from Friedr. Freek GmbH.

Please read this document carefully before installing the heater in order to learn important facts regarding the product's safety and use.

More information about our products you can find on our website: **freek-heaters.com**.

Content:

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Introduction

With infrared radiation from our infrared emitters, a wide variety of materials can be heated without contact. The energy transfer from the emitter to the product takes place almost immediately when the unit is switched on. Heat radiation as electromagnetic radiation is as fast as light and does not depend on "slow" transport media. Infrared heaters can therefore be used both in a vacuum and in an ambient atmosphere. The various designs and infrared wavelengths allow them to be used in a wide variety of applications.

Short-wave quartz heaters are the infrared heaters with the highest radiation intensity (up to 20 W/cm²). They consist of a coiled tungsten wire in a hermetically sealed quartz glass filled with inert gas. Depending on the desired emission spectrum, differently coiled heating wires are used. R7s-connections are used as standard as they are also common for halogen spotlights as light sources. Alternatively, we offer various other fastenings and connections.

The heating and cooling times are only a few seconds, which makes them ideal for applications with short cycle times that have to start quickly or cool down quickly, for example when the conveyor belt is at a standstill.

Safety

As a manufacturer of heating elements, Freek is not responsible for the conditions in which their heating elements are installed, connected and used in the various customer-specific applications, nor is Freek responsible for how the heating elements are controlled. Rather, it is the customer's responsibility to be aware of and observe good engineering practice as it is recognised in the application and business markets in question. For example, many machines and their equipment are subject to the standard EN 60204 "Safety of machinery – Electrical equipment of machines".

Additionally, the customer is responsible for ensuring that electrical heating elements are only ever connected under the responsibility of a qualified electrician. This is because only a qualified electrician will know the risks associated with electrical heating elements, such as fire, explosion, combustion or electric shock, and – even more importantly – will know the safety measures that need to be put in place in order to prevent such events from occurring, even if the heating elements malfunction. Examples of these safety measures include protection against contact, thermal insulation, electrical insulation, temperature control, overtemperature prevention, earthing, residual current operated circuit breakers, overcurrent circuit breakers and miniature circuit breakers.

General Remarks & Handling

Freek's quartz-halogen/tungsten heaters emit primarily medium-wave and short-wave infrared radiation. The output is generated by a high-temperature tungsten coil housed in a sealed quartz tube.

Quartz halogen/tungsten heaters are a very powerful heat source, so some precautions must be taken during installation and operation.

- Gloves should be worn while handling the heater. Finger prints can affect the optical properties of the glass tube and may reduce the operating life of the heater.
- If necessary, clean any dirt, oil or lint from the heater with alcohol and a lint free cloth or tissue.
- Quartz halogen heaters can produce high intensity white light which could cause damage to human eyes. Care should be taken to ensure that personnel cannot look directly at the heaters during operation. If necessary, a filter to reduce the glare or protective glasses should be provided. In such cases, personnel should be warned of the danger using suitable signage.
- The heater is designed for horizontal operation only unless clearly specified for vertical operation.
- Quartz halogen/tungsten heaters may take up to 10 times the normal operating current when operated from cold (normal room temperature). Ensure that fuses or other protective devices are correctly specified to handle high starting currents.

- In cyclical processes, complete switch-off of the heaters should be avoided, as the high currents when frequently switched on again can have a negative effect on the service lifetime. If possible, the heaters should instead be kept on stand-by at low power.
- Ensure the heater is not exposed to vibration during operation as this will also reduce operating life.
- Excessive mechanical or physical force during handling or installation could break or damage the glass tube. Broken glass may be hazardous to personnel and also the heating process.
- Always turn the electrical power off before inserting, removing or cleaning the heater.
- Ensure heaters do not radiate directly onto nearby heaters as this will increase operating temperature and reduce operating life.
- The heater should be installed by a qualified person ensuring all relevant electrical safety standards are adhered to.
- The heaters should only be used in approved fixtures designed for quartz halogen/tungsten heaters.

Risk of Overheating

- The aluminised projector/reflector or housing sheet metal used for our emitters begins to corrode at temperatures above 500 °C. This causes the sheet metal to lose its reflective properties, which can result in critical overheating and thus destruction of the emitters.
- Under normal circumstances 500 °C is rarely reached, even in high-power applications, due to the excellent reflective properties of the sheet metal (reflection factor ˜0.96). However, contamination, condensation, dripping water and "face-to-face" operation of radiators, reflectors, projectors, infrared platens can reduce the reflective effect and thus increase the risk of overheating.
- If these risks cannot be ruled out, we recommend using reflector plates and housings made of polished stainless steel (on request!), providing air cooling or using external temperature sensors to prevent overheating by temperature controllers.
- The heaters must be protected by suitable measures (shielding, ventilation, sufficiently dimensioned "cold" connection length) against reaching temperatures above 300 °C at the hermetically sealed flat connection ends. Otherwise the seal may be damaged, resulting in the immediate destruction of the radiators.
- When operating in a (partial) vacuum, the external convective air cooling is hardly present, if at all. The risk of critical overheating of the hermetically sealed flat connection ends is greater as a result. To minimise the risk of overheating, we therefore recommend not using standard radiators but instead dimensioning the cold connection ends longer. If standard emitters with "cold" standard connection length fail in applications in (partial) vacuum due to overheating of the connection ends, this is the sole responsibility of the customer.
- Ensure the temperature of the glass tube does not exceed 800°C.
- Ensure the heaters are operated at a safe distance from combustible materials.

Overcurrent

- Our infrared heaters are designed for operation at specified voltages. Any higher operating voltages differing from this can considerably reduce the lifetime or lead to immediate failure (15 % more voltage = 32 % more power!!!).

Installation Position

- The heater is designed for horizontal operation only unless clearly specified for vertical operation.
- In moving applications/fields, it must be ensured that quartz heater tubes are always mounted crosswise to the direction of movement.
- Install electric heating elements in systems, machines, and devices in such a way that they are easily accessible at all times and can be easily replaced if necessary. Heating elements are wear parts: they age due to temperature-related structural changes in the heating conductor material and can fail due to operational and application-related influences (e.g., thermal expansion, vibration, corrosion, contact

with aggressive media) as well as due to incorrect operation or control errors. In the event of a malfunction, replacement is necessary.

Safety Distances

- Ensure that infrared heaters cannot be touched during operation and that a safe distance to the heater is maintained so that no fires or burns can be caused by the radiation.
- The temperature of the infrared heaters can reach much higher than 600 °C at the glass surface. As with all hot heat sources, it must be ensured that the atmosphere in which the heaters are operated does not contain explosive gases that could be ignited on contact with the heater surface. In all cases, the operator is responsible for ensuring that the heaters are suitable for the application.
- Due to thermal expansion, a minimum distance of 5 mm must be maintained between two heater units (halogen heater in reflector).
- The recommended distance between the radiant surface and the material to be heated is 100 to 200 mm.

Ventilation

- Substances that evaporate due to heat radiation can reduce the radiation power and lead to problematic deposits on leads and reflectors. Depending on the application, sufficient ventilation of the working area therefore must be provided.

Tests

- In every application, there are, in practice, working and environmental parameters which cannot be calculated exactly in theory. That is why we recommend generally to test cartridge heaters in the application under real working conditions in advance.

No warranty claims can be derived from these user instructions.