

Ceramic Heaters Long-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:

Introduction.....	2
Safety.....	2
General Remarks & Handling.....	2
Risk of Overheating.....	2
Overcurrent.....	3
Safety Distances.....	3
Ventilation.....	3
Tests.....	3
Wiring Diagram.....	3
Mounting of Ceramic Radiators / Installation in Reflectors.....	4

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Download our contact details on your smart phone. Just scan the code with your QR Reader App.

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 after switching on. This is because heat radiation, as electromagnetic radiation, is as fast as light and does not depend on "slow" transport media. Infrared emitters can therefore be used both in a vacuum and in an ambient atmosphere. The different designs and infrared wavelengths allow them to be used in a wide variety of applications.

Long wave ceramic heaters are robust, standardised and reasonably priced. At surface temperatures of 300°C to 750°C ceramic heaters emit medium-wave to long-wave infrared radiation between 2 and 10 µm. Most plastics and many other materials absorb this wavelength very well. Basically, there are two types: solid ceramic elements and hollow ceramic elements. The latter are hollow behind the heating wires, which ensures shorter heat up and cool down times as well as reduced heat losses to the rear. Both are available in standard dimensions, with and without thermocouple type K. Additionally, matching accessories such as reflectors are available whereby front emitted radiation in excess of 95% can be achieved.

Safety

As a manufacturer of heating elements, Freek is not responsible for the conditions in which its 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

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.
- It must be avoided under all circumstances that the surface temperature of ceramic heaters exceeds 750°C.

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!!!).

Safety Distances

- Please ensure that you always leave sufficient space between the beaded leads of our ceramic infrared heaters and the mounting or cover plates above/below them. In certain contaminated atmospheres, conductive deposits can form on surfaces which increase the risk of earth faults or short circuits.
- We recommend using a glass fibre sleeve over the beaded leads as additional touch protection measure.
- 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 ceramic 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 heaters.
- The recommended distance between the radiant surface and the material to be heated is 100 to 200 mm.

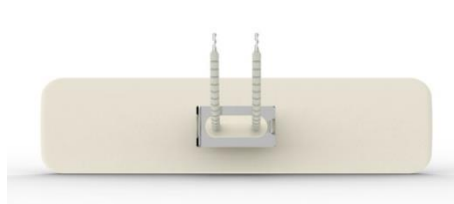
Ventilation

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.

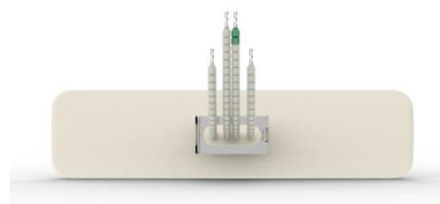
Tests

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

Wiring Diagram



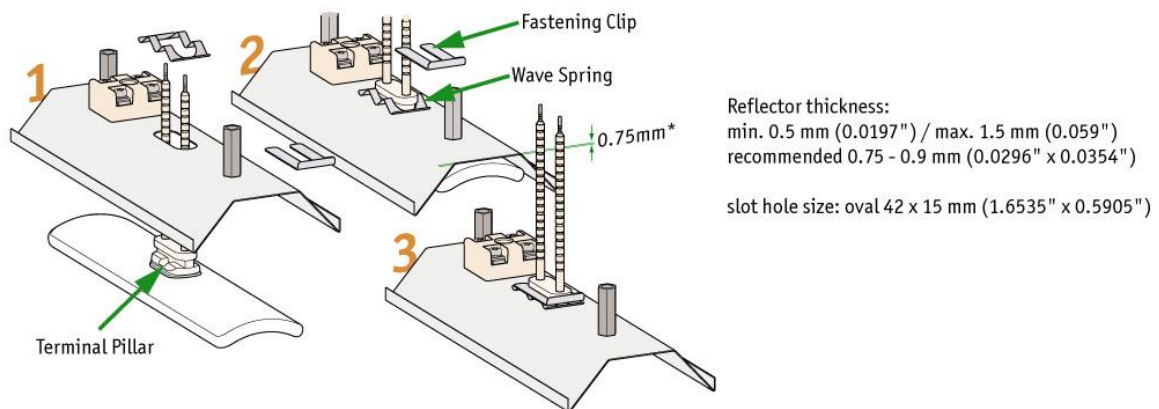
without thermocouple



with thermocouple

L + N	outer, shorter leads
TE + (NiCr)	inner, longer leads with green marking
TE - (Ni)	inner, longer leads without marking

Mounting of Ceramic Radiators / Installation in Reflectors



- Our ceramic terminal pillar is an integral part of the heater assembly. The heater back and the terminal pillar are one single ceramic component, which enhances the bonding strength of the heater. Compliance with the specified basic strength of the terminal pillar is monitored through AQL-sampling inspection. (see video: "strength testing of ceramic terminal pillar").
- The ceramic heaters are secured in place by inserting the fastening clip without using any tool to prevent damage to the guide groove of the ceramic terminal pillar (breakage, chipping).
- In cases where device-specific heater housing or custom heating platens with multiple closely spaced ceramic elements limit mounting freedom, manual insertion of the fastening clip may be challenging. In such situations, and/or when using reflector plates with a thickness over 1 mm, reducing the wave spring height may facilitate assembly. However, make sure that the ceramic heater fits securely (see video „adjusting wave spring height“).
- When laying and connecting the beaded connection wires, do not pull on them as it may cause the wire connection inside the ceramic heater to break or shift. If this happens, the heater will no longer be safe to operate and must not be used.
- Damages resulting from improper installation are not covered by warranty. To facilitate easy proof that any damage or irregularities were present upon delivery, all our ceramic heaters are wrapped in protective film.

No warranty claims can be derived from these user instructions.