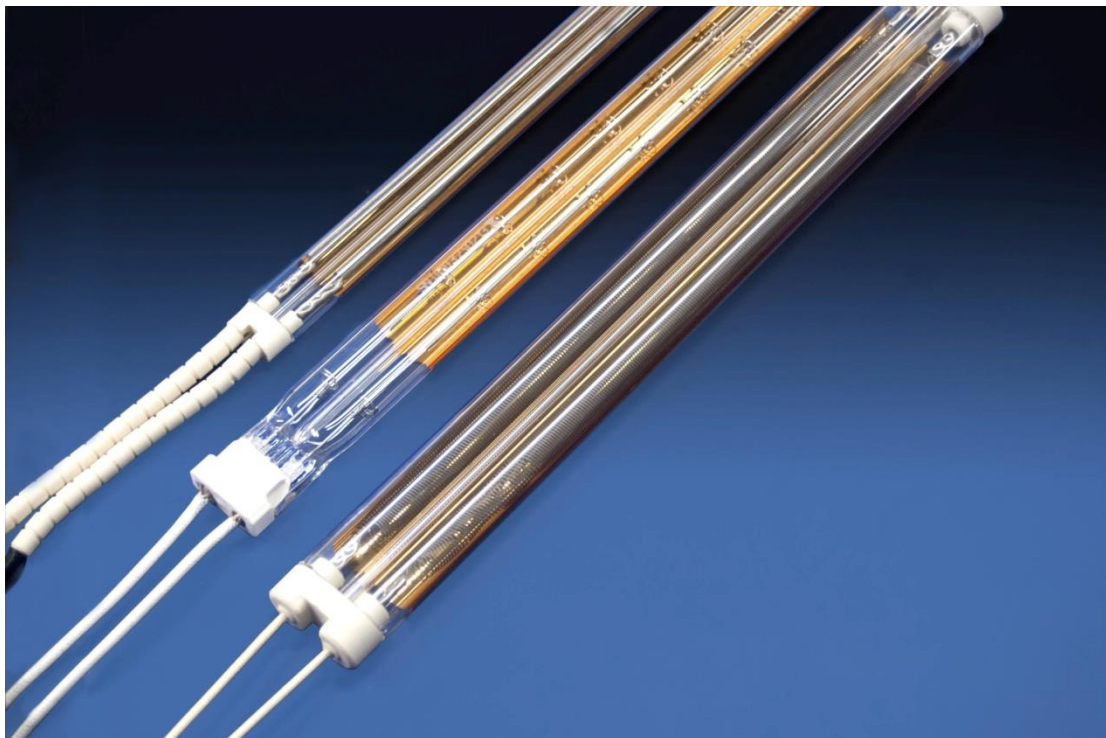


Operating instructions

IR emitters

**NIR, IRK, IRsM, IRM emitters
twin-, single tube emitters with/without reflector**



Imprint

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Warning notes and symbols in the operating instructions

These operating instructions describe the IR emitters, their installation, operation and capabilities. The safety and warning notices explain the safe, proper handling of the emitters.

You will find the symbols listed below next to all safety and warning instructions in these operating instructions where there is danger to life and limb. An additional signal word indicates the severity of a possible danger.

Observe these notes closely and be especially careful in these cases in order to prevent accidents.

DANGER! This signal word marks a danger with high risk or an immediately threatening danger. If it is not avoided, death or very severe injuries/damage to health will result. Damage to property is possible.

WARNING! This signal word marks a danger with medium risk or dangerous situation. If it is not avoided, death or very severe injuries/damage to health could result. Damage to property is possible.

CAUTION! This signal word marks a danger with low risk or marks a possible danger. If it is not avoided, slight injury/damage to health could be possible. Damage to property is possible.

The symbols used in these operating instructions have the following meaning:



This symbol warns of a hazard.



This symbol warns of a hot surface.



This symbol warns of hazardous electrical voltage.



This symbol recommend protection against a glare hazard.

The two following symbols are used to address practices for optimal operation and/or prevention of damage to the equipment. This information is not related to hazardous situations. Additionally, the signal words **ATTENTION!** and **NOTE!** are used.



ATTENTION!

This symbol with signal word is found at those places in the operating instructions which must be observed so that damage or destruction of the equipment is prevented.



NOTE!

This symbol is found next to notes, tips on operation and useful information.

1. Function description IR emitters

1.1 IR emitters

IR emitters consist of a heating coil, which is mounted in a quartz glass tube. We differentiate our IR emitters after used quartz tube in twin tube emitters and single tube emitters, and according to temperature of the heating coils in NIR (near infrared, 2600K), IRK (short-wave, 2300K), IRsM (fast medium-wave, 1600K), IRM (medium wave, 900K). All emitters can be equipped with a gold reflector, which can direct almost all the IR power in one direction. With regard to the construction designs, the possible lengths and the technical data, we refer to the product information and datasheets of the emitters, which are available as separate documents.

1.2 IR radiation in general

IR radiation is the region of the optical spectrum of electromagnetic radiation, which is no longer visible to the human eye, and which adjoins the visible region after longer wavelengths (see figure 1). The usual classification defines wavelengths between 780 nm and 1.4 μm as IRA. IRB is the range between 1.4 and 3 μm. These two areas together are also described as near infrared. The range above 3 μm is called IRC range or the mid-infrared. From 50 μm this goes into the far infrared.

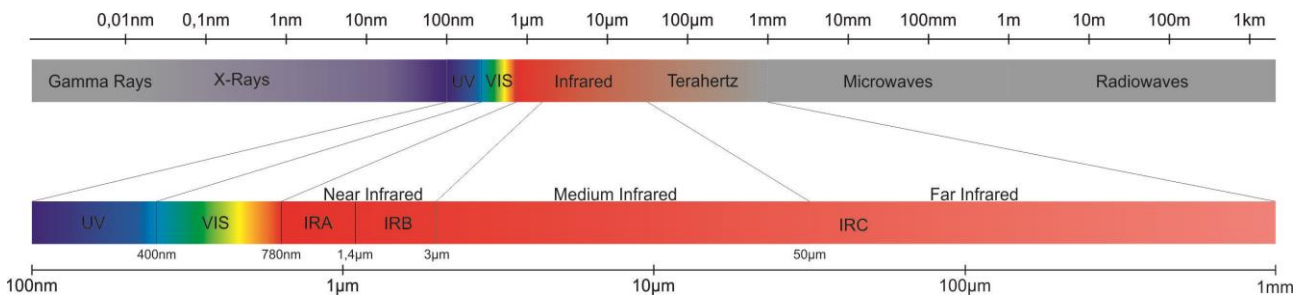


figure 1

1.3 Spectrum of IR emitters

The emission spectrum of IR emitters depends on the filament temperature (see figure 2). IR radiation is pervasive. Longer wavelengths have a greater penetration depth.

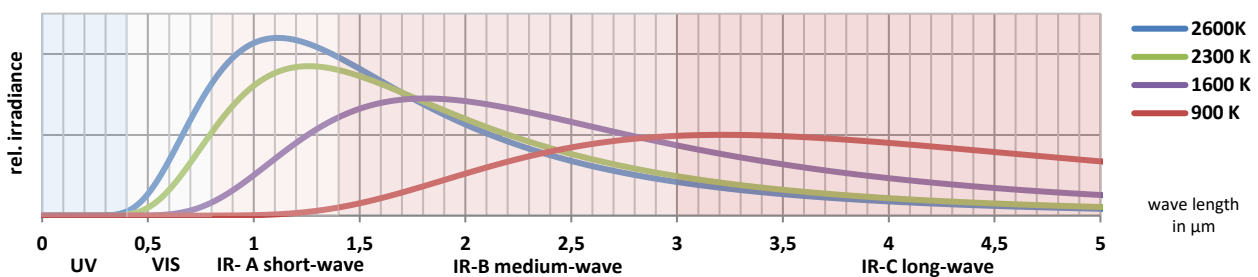


figure 2

1.4 Operation of IR emitters

IR emitters can be designed for any supply voltage. A ballast is not needed. The heating coils installed in the IR emitters require a warm-up time to reach operating temperature. The necessary heating time decreases in the direction of shorter wavelengths. For example, NIR IRK and IRsM emitters only need a few seconds to heat up, while IRM emitters take over a minute. IR emitters can be dimmed as desired via a power control. With regard to the application, the associated shift in the emission spectrum must be taken into account (see figure 2). The frequency of the circuit does not affect the life of the emitter.

2. Safety instructions

2.1 General information

A sound knowledge of all basic safety regulations is essential to ensure safe and fault-free operation of IR emitters. This operating manual contains all important safety regulations to ensure safe operation of IR emitters. In particular the safety instructions must be observed by all persons working with the emitters. In addition, all relevant rules and accident prevention regulations relating to the operation site must be observed.

In regular intervals, the operator has to check that all personnel are observing the safety regulations.

2.2 Appropriate use

The operator may only operate IR emitters as stipulated by the operating instructions in this manual and must follow the relevant rules for accident avoidance.

ATTENTION!



uv-technik Speziallampen GmbH is not liable for damages resulting from inappropriate use of IR emitters.

2.3 Staff obligation

Before commencing work, all persons entrusted with work to be performed on IR emitters undertake the following:

- to observe the safety at work and accident prevention regulations
- to read the chapter on safety and the warnings printed in this manual and to observe them at all times while using the equipment

2.4 Hazards from handling the equipment

The IR emitters have been manufactured in accordance with the very latest state-of-the-art technology and the recognized rules of safety technology.

The equipment may only be used under the following conditions:

- it is used for the purpose for which it was constructed
- in a condition in which the equipment complies with all safety technology requirements



Danger! – HAZARDOUS ELECTRICAL VOLTAGE!

Switch off the main switch and the main contractor before working on IR emitters , e.g. during replacement, to avoid danger of electric shock.

Attention: Danger of death



WARNING! – DANGER OF CUTS!

IR emitters can break. Wear appropriate gloves while assembling to avoid cuts from broken glass of IR emitters.

Attention: Health risk



WARNING! – HOT SURFACE!

IR emitters become hot during operation. To avoid burns the IR emitters have to have enough time to cool down after switching off, e.g. in case of replacement.

Attention: Health risk



WARNING! – GLARE HAZARD!

In particular, the short-wave NIR, IRK and IRsM emitters are very bright in operation. To avoid blinding, it is recommended to wear protective goggles.

Attention: Health risk

2.5 Warranty and liability

The General sales and delivery conditions of uv-technik Speziallampen GmbH apply. The operator will have received these terms, at the latest upon signing the contract.

uv-technik Speziallampen GmbH is not liable for any damage to persons or property arising from any one or more of the following:

- inappropriate use of IR emitters
- incorrect assembly, commissioning and operation
- operation of systems with a faulty and/or non functioning safety and protection device
- non observance of the instructions given in the user's manual with reference to the safety, transport, storage, assembly, commissioning, operation and servicing of the device
- unauthorized repair or alterations to the construction of IR emitters
- repairs which are carried out incorrectly
- catastrophes, the action of foreign bodies or acts of God
- damages or losses originated from the use or a defect of IR emitters

2.6 Organizational measures

All safety devices on the equipment must be tested for correct functioning regularly, prior to carrying out work and at each shift change. Look for external signs of damage.

2.7 Informal safety measures

In addition to this user manual, the generally and locally applicable accident prevention and environmental protection regulations must be made available and observed.

Danger due to electricity



DANGER! – HAZARDOUS ELECTRICAL VOLTAGE!

There is a danger caused by direct or indirect contact with electricity!

The electrical components of IR emitters must be inspected regularly.

Before commencing work:

- check all equipment components for external signs of damage
- check that all electric cables are in perfect condition

Loose connections must be tightened and damaged wiring replaced immediately.

3. Transport, delivery, storage

The IR emitters will be delivered in an appropriate packing. Any damage detected must be documented at once and reported immediately to your specialist dealer or directly to uv-technik Speziallampen GmbH. Please note the insurance conditions and Incoterms that will be provided in the offer.

The storage of the IR emitter must be done in a dry, non-corrosive environment.

4. Ordering data for equipment

Order IR emitters from:

uv-technik international ltd
Office E04, Basepoint Business Centre,
110 Butterfield, Great Marlings,
Luton, LU2 8DL (UK)

Tel: 44 (0)1582 805410

E-Mail: info@uv-technik.co.uk

To allow clear assignment on all orders the article number and name of the IR emitters must be specified. If unknown our sales staff would be pleased to help you to find out the correct IR emitter and explanation of differences in detail.

NOTE!

Nearly all of our IR emitters will be produced according to the order. Occasionally longer lead times may occur (e.g. if upstream suppliers are not able to deliver or in case of unforeseen events). Hence please calculate your order with a sufficient safety stock, especially for systems in which downtimes are unacceptable. uv-technik Speziallampen GmbH is not liable for damages or losses caused by such delivery delays. In such cases we recommend blanket orders, so that replacement emitters are held on stock. In this regard we refer also to our sales and delivery conditions.

5. Repair

The repair of IR emitters is, with a few exceptions, not possible. In doubt please contact us.

ATTENTION!

We accept no warranty for damages to the IR emitters caused by non-observance of the operation instructions. No repairs or changes to IR emitters other than those described in this manual may be carried out. In case of claims appropriate evidence must prove the observance of the required operation conditions.

For repair or claim IR emitters normally have to be shipped to us. Please contact us in advance to agree the cheapest delivery. Please keep the following disclosures ready:

- IR emitter type, article number, delivery note number, customer number
- operation conditions (if there is a context with the claim)
- dimensions and weight of the consignment

**ATTENTION!**

Please note that cash on delivery will be not accepted.

For the complaint process, an operation number is assigned either in advance or upon receipt. We confirm the receipt of the shipment. After checking the IR emitters you will be notified. We will contact you if consultation is necessary. Inquiries are possible at any time if you tell us the above mentioned operation number.

If a claim is justified, you will receive a replacement. The detailed warranty regulations can be found at www.uvtechnik.com.

6. Faults

Damaged or failed IR emitters must be disposed as electronic waste. They contain no hazardous substances. The country-specific rules for disposal must be observed.

7. Installation instructions for IR emitters

7.1 General

**ATTENTION!**

Installation, electrical connection, maintenance and care of IR emitters must be carried out by qualified specialists.

These operating instructions, the information in the data sheets on IR emitters, and the applicable legal rules for health and electrical safety must be observed.

7.2 Operating voltage

IR emitters are normally operated at the supply voltage for which the particular emitter-type was specified. Taking into account the installation situation and the operating mode, a different operating voltage may be necessary. If the emitter is installed heavily encapsulated, it may excessively heat up when operated at rated voltage. In such cases, the operating voltage must be reduced (dimming) or the IR emitter must be designed in advance for a slightly higher operating voltage. If the IR emitter is strongly cooled during operation, a higher operating voltage may be necessary or the IR emitter must be designed in advance for a slightly lower operating voltage.

7.3 Electrical safety, cabling

Wiring and terminal points must be designed according to the power / currents of the IR emitters. It is to choose silicone-free cable material. In addition, the cable specification must comply with the existing environmental conditions. The insulation material of the cables must be heat-compatible if necessary. Also note the possibly necessary increase in the cable cross-section due to the higher ambient temperature. Any damage to the cable should be avoided. Cable glands through housings must not have any burrs and must be sufficiently insulated. At high temperature load ceramic bushings can be used. The same applies to edges where cables are routed. Kink protection is to be used and the bending radius must be observed.

**DANGER! - FIRE HAZARD!**

The connecting cables of each emitter must be laid separately. Bundling could lead to overheating due to self-heating of the cables.

Unless otherwise agreed, the length of the insulated nickel stranded wire on our IR emitters is 500 mm. The insulation of the stranded wire consists, unless otherwise agreed, of a PU-impregnated, glass fibre insulation with a continuous temperature resistance of 400 °C maximum. Upon request, PTFE insulated nickel stranded wires with a continuous temperature resistance of 220 °C can be supplied at no extra charge. Other cross sections or bare nickel stranded wires are possible. Bare stranded wire is suitable if the connecting cable is to be equipped with ceramic beads by the customer.

**NOTE!**

In case of PU-impregnated, glass-fiber-insulated nickel stranded wire, the insulation discolors above 250 °C, which has no influence on the insulation effect and the mechanical stability at temperatures below 400 °C.

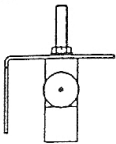
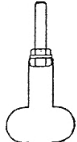
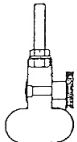
7.4 Place of installation

IR emitters may only be installed and operated in a dry, dust-free and chemically and biologically inactive environment. The assembly must not take place in vibrating system parts. Notes on the installation position must be observed. The assembly of the IR emitters in the system has to be arranged in such a way that a proper cooling of the IR emitters and, if necessary, of the connecting cables is guaranteed.

7.5 Installation and mounting of IR emitters

The installation of IR emitters must be carried out stress-free. The quartz glass of the IR emitters has a very low expansion coefficient of approx. $5.5 \times 10^{-7} \text{ }^\circ\text{C}$. Metallic housings, in which the emitters are usually installed, have a considerably greater length, which must be taken into account. In the following table you will find the fasteners out of our product range, which can be used for all double-tube IR emitters. Each element is available in 3 sizes, matching the available twin-tube sizes.

Long IR emitters need a center support. The following table does explain, from which emitter length such a center support is recommended.

depiction	designation	note
	spring clip FH 1785 spring clip FH 2211 spring clip FH 3015	spring clip with locking angle for IRM emitters
	center support MU 1785 center support MU 2211 center support MU 3015	recommended from 1000 mm recommended from 1500 mm recommended from 2000 mm
	clamping bracket KH 1785 clamping bracket KH 2211 clamping bracket KH 3015	clamping brackets for IRSM-/IRK emitters

When installing IRM emitters, use spring clips with locking angles. Care must be taken that a distance of a few millimeters is maintained between the locking angle and the ceramic end cap. The locking angle prevents slipping out of the ceramic end caps. For IRsM / IRK emitters this can be omitted. Please use the clamping bracket for these emitters. The clamping effect can be adjusted by means of a knurled screw. For stress-free installation, it is necessary that one side is only loosely clamped (floating bearing).

IR emitters are usually intended for horizontal installation. A vertical installation is only allowed if they are designed for this purpose in the factory. Please note the relevant descriptions of the emitters in the delivery papers or data sheets.

7.6 Treatment and care of IR emitters

Expert maintenance is essential for the optimal effectiveness of IR systems. Depending on the operating conditions, the IR emitters must be cleaned regularly. The lifetime and the radiation intensity of the IR emitters are significantly influenced by the degree of contamination of the glass surface. For cleaning linen towels soaked with methylated spirits are recommended. Other alkali-free detergents approved in the food industry can also be used. Wet cleaning with water or even immersion of the IR emitters in water is not permitted. It is recommended to wear gloves to avoid fingerprints. These should also provide a cut protection if necessary.

ATTENTION!



The gilded side must not be cleaned!

Dust contains abrasive components that would remove the gold layer.

IRM emitters should not be removed for cleaning. After the first use of the IRM emitters, the heating coils lose their natural spring tension, which holds the ceramic end caps in their position in the twin-tube during transport (see also the previous section on installation and fastening). When removing used emitters there is a risk that the end caps fall out of the twin-tube and the heating coil is twisted. In a re-installation, the

uniform distribution of the heating coil can not be restored and there is a danger of local overheating of the coil, which destroys the material of the heating coil.
IRsM or IRK emitters may be removed for cleaning.

7.7 Health protection when working with IR emitters

As already explained in point 2.4, health protection primarily concerns electrical safety and protection against burns. In addition, the aspect of cut protection must be observed in all work with glass parts.

In addition to the known technical contexts, all given instructions of this document are based on our experiences. We take no guarantee of completeness and correctness.