

Operation Manual Infrared Emitters Group 51

Medium wave Infrared surface emitter for IR Modules model series MX-I...MAX

Keep for future reference.

80061243_E

Infrared Emitters

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Table of contents

1	Introduction	4
2	Safety instructions	5
2.1	List of the symbols used	5
2.2	Target group, personnel qualifications	7
2.3	Basic safety instructions	7
3	Product description	12
3.1	Use as intended.....	12
3.2	Ambient conditions	13
4	Installation conditions	15
5	Transport	18
6	Mounting	20
6.1	Installing the emitter.....	21
6.2	Check.....	21
7	Maintenance	22
7.1	Cleaning.....	23
8	Disposal	24

1 Introduction

This operation manual provides instructions for assembly, use and care of the product.

This operation manual is for people installing, operating and servicing the product.



- ➔ Read this operation manual prior to initial operation.
 - ➔ Observe this operation manual.
 - ➔ Ensure that this operation manual is available to all persons handling the product.
 - ➔ Make sure the operation manual can be consulted without a problem at any time during the service life of the product.
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The proper function of the product is guaranteed only if:

- ➔ The product is mounted in accordance with the instructions.
- ➔ The operation manual and the recommendations regarding maintenance are observed.
- ➔ Original Heraeus Noblelight components are used for mounting.

Heraeus Noblelight cannot be held liable for any damage or disturbance of operations caused by non-compliance with the instructions given in the operation manual.

- ➔ Please contact Heraeus Noblelight Service team if you have any questions.
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Risk analysis

The operator of the machine in which the infrared emitters are used is obligated to perform a risk analysis regarding the use of the product in the work environment.

The risk analysis must also assess the effects on the surroundings or the users of the infrared radiation generated when the product is used as intended.

Text markup

The markups used in the text indicate the following:

- **Bold** = important word
- *Kursiv* = reference to a chapter or menu item
- ➔ = instruction; something needs to be done

2 Safety instructions



➔ Observe the safety instructions.

Non-observance of the safety notes causes hazards to persons, the environment and the product.

2.1 List of the symbols used

Various symbols are used in this operation manual to identify residual risks of different hazard levels. The symbols help the user to detect and memorise risks more quickly and easily.

Signal words

DANGER	The signal word indicates a high-risk hazard which, if not avoided, will cause death or severe injury.
WARNING	The signal word indicates a medium-risk hazard which, if not avoided, may cause death or severe injury.
CAUTION	The signal word indicates a low-risk hazard which, if not avoided, may cause minor or moderately severe injury.

Warning signs

 **DANGER**



Dangerous voltage

➔ Observe the safety instructions.

 **WARNING**



Generic warning

➔ Observe the safety instructions.

 **DANGER**



Explosion hazard

➔ Observe the safety instructions.

 **CAUTION**



Hot surface

➔ Observe the safety instructions.

 **CAUTION**



Infrared radiation

➔ Observe the safety instructions.

 **WARNING**



Danger of fire

➔ Observe the safety instructions.

 **CAUTION**



Warning of injury to hands

➔ Wear protective clothing.

 **CAUTION**



Warning of injury to hands

➔ Wear protective clothing.

Mandatory action symbols



➔ Read the operation manual.



➔ Note regarding optimal use.



➔ Safety glasses must be worn.



- ➔ Wear gloves.



- ➔ Disconnect from the mains before carrying out any work.

2.2 Target group, personnel qualifications

This product must only be operated by instructed personnel.

Emitters must be replaced only by persons instructed in carrying out electrical work.

Electrical connection must only be carried out by electricians.

2.3 Basic safety instructions

Personal protection equipment



- ➔ The following personal protective equipment must be worn when handling the product:



- Cut-resistant protective gloves
- Safety goggles

Danger of breaking

 **CAUTION**



Warning of injury to hands

Infrared emitters are made of quartz glass which can break. When quartz glass breaks, the splinters have sharp edges that may cause injury.

- ➔ Wear protective clothing.
- ➔ Prevent the following:
 - Heavy vibration
 - Shock
 - Contact with other machine parts
 - Contact with the substrate to be heated
- ➔ Transport the infrared emitters only in their original packaging.

Risk of electric shock

DANGER



Dangerous voltage

Heat, splinters etc. will cause damage to the insulation of the infrared emitter's connecting wire.

- ➔ Arrange the infrared emitters in the machine in such a way that the infrared emitters and the connecting wires cannot be touched and are not accessible.
- ➔ Make the infrared emitters accessible only after disconnecting them from the mains.

DANGER



Dangerous voltage

When the infrared emitter breaks during operation, a dangerous voltage occurs at the filament.

- ➔ Make the infrared emitters accessible only after disconnecting them from the mains.

Danger for the eyes and skin

CAUTION



Infrared radiation

Infrared emitters emit strong infrared radiation. Many infrared emitters moreover emit dangerous visible radiation in accordance with category 2 of EN 12198-1.

Eyes and unprotected skin exposed to direct or indirect infrared radiation are at hazard.

- ➔ Protect persons by means of suitable personal protective equipment.
No hazard must occur.
- ➔ Comply with the machinery directive and the directive regarding artificial optical radiation.
- ➔ Observe the safety instructions.
- ➔ Do not look into the radiation.
- ➔ Arrange the infrared emitters in the machine in such a way that they cannot be looked at directly during operation.
The emitter must be made visually accessible only after disconnection from the mains.

Danger of fire

WARNING



Danger of fire

The heated surfaces and the hot surface of the infrared emitter pose a fire hazard.

- ➔ Do not expose highly flammable substances to radiation.
- ➔ Use in explosion hazard areas is prohibited.



➔ Prior to use, check the suitability of the medium to be exposed to radiation.

➔ Avoid self-ignition of the medium.

Explosion hazard

DANGER



Explosion hazard

Potentially explosive atmospheres may be ignited at the infrared emitter and at the surface heated.

The solvent vapour concentration must be less than 25% of the lower explosion limit. This also applies to highly flammable dusts and all organic dusts.

- ➔ Observe standard EN 1539 where a potentially explosive atmosphere may be created due to solvent vapour-air mixtures or accumulation of dust.
- ➔ Released vapours and dusts must be extracted by means provided by the client.
- ➔ Observe the safety regulations regarding the processing of coating materials.



Heated surfaces and the infrared emitter itself may be hot enough to act as an ignition source even a long time after switch-off.

Danger of electric shock

DANGER



Dangerous voltage

The infrared emitters and their connecting wires only have a basic insulation: protection against direct contact.

- ➔ Arrange the infrared emitters in the machine in such a way that the infrared emitters and the connecting wires cannot be touched and are not accessible.
- ➔ Include the infrared emitter mounting/retainer in the protective conductor system of your plant.
- ➔ Make the infrared emitters accessible only after disconnecting them from the mains.

The connecting wires will lose their flexibility and become brittle during operation.

There is a danger of breaking and loss of insulation.

- ➔ After installation and initial operation, do not move or relocate/re-lay the connecting wires.
-

Danger of burning

CAUTION



Hot surface

During operation and for a long time after switch-off, the infrared emitters and their surroundings have very hot surfaces.

Contact with the hot surface will cause severe burns.

- ➔ Arrange the infrared emitters in the machine in such a way that they cannot be touched during operation.
 - ➔ Make the infrared emitters accessible only after disconnecting them from the mains.
 - ➔ After switching them off, wait a sufficient time for the infrared emitters to cool down.
-

Danger due to leakage current

 **DANGER**



Dangerous voltage

Infrared emitters have a leakage current.

- ➔ Inhibit or limit the leakage current by:
 - Insulating the mountings of the infrared emitters.
 - Using original Heraeus Noblelight clamping springs and retaining spring or comparable devices made of high-temperature steel.
 - ➔ Protect the system against leakage currents.
-

3 Product description

3.1 Use as intended

Infrared emitters are intended for use in industrial electroheat installations such as those used for heating or drying processes.

Reasonably foreseeable misuse

The following exclusions apply:

- Exposure of humans or animals to radiation
- Use in any non-industrial environment such as for wellness or medical purposes
- Use for general lighting
- Use outdoors
- Use in wet atmospheres
- Use in explosive or combustible atmospheres

 **DANGER**



Explosion hazard

- ➔ Use in explosion hazard areas is prohibited.
-



The infrared emitters are special-purpose lamps as defined in the following EU Directive:

- **244/2009** regarding the ecodesign requirements for non-directional household lamps (Federal Environmental Agency).

This product must not be used for general lighting.
Any use of the product in other than the intended industrial applications is not admissible.

Any use not specified in the operation manual requires approval by Heraeus Noblelight.

3.2 Ambient conditions

⚠ DANGER



Explosion hazard

- ➔ Use in explosion hazard areas is prohibited.

Our products are used in a multitude of very different processes, plants and environments. Any list of environmental conditions cannot be exhaustive. However, a rule for other cases can be derived from the following:

The following groups of factors are relevant in this respect:

Thermal	Ambient temperature < 900°C
	Temperature of the electrical supply lines < 900°C, temperature of the emitter tube < 950°C
Mechanical	No excessive mechanical stresses
	No abrasive materials
	Detailed limits exist for acceleration and vibration, which are specified in our "Customer information regarding the service life of Heraeus Noblelight infrared emitters".
	Never shock
Electrical	Continuous operation at up to 100% of the rated voltage is admissible.
	Very strong magnetic fields have to be avoided.
	In a vacuum, voltages have to be limited (< 80 V).
Chemical	No seawater or seawater spray
	Avoid combinations of phosphor and high temperature.
	No contact with alkali or alkaline earth metals.
	No contact of pinch or wires with selenium.
	Hydrogen up to 10 ppm
	No fluorine
	Air as atmosphere
Operation	Frequent switching may result in damage beyond about 100,000 cycles.
	By trained personnel only
Dust	No dust deposits
	No deposit of electrically conductive fibres

Biological	No fouling from biofilms
	No animals
Water	Air humidity < 95% at 40°C or < 30 g m ⁻³
	Dripping water is acceptable for a short time but formation of films is not (e.g. carbonates).

4 Installation conditions

Infrared emitters are intended for use only as a heat radiation source in plants or machines for industrial heating or drying processes.

All parts of the infrared emitter, including the connecting wires attached to the emitter, must be located inside the plant or machine.

Among other things, the plant must ensure protection of the operator and personnel against the hazards originating from the infrared emitter, in particular protection against electric shock, heat, radiation and mechanical injury.

The infrared emitters must be operated in the specified operating position.

Explosion hazard area

 **DANGER**



Explosion hazard

- ➔ Use in explosion hazard areas is prohibited.



Infrared emitters are not intended for use in potentially explosive or combustible atmospheres.

Use in potentially explosive or combustible atmospheres is permitted only as part of a device which in its entirety meets the requirements of the ATEX Directive as amended from time to time and the corresponding harmonised standards.

The distributor of the machine is responsible for ensuring this.

Rated voltage

 **WARNING**



Generic warning

- ➔ Infrared emitters must not be operated with a voltage higher than the specified rated voltage taking account of the continuous-operation voltage specified in EN 60519-1 *Safety in electroheating installations*.

Prolonged operation at voltages higher than the rated voltage will cause destruction or substantially reduce the service life of the infrared emitters.

Connecting wires

The connecting wires of the infrared emitters are intended for installation into electrical equipment or systems (in acc. w. EN 60204-1 *Safety of machinery - Electrical equipment of machines* and EN 60519-1 *Safety in installations for electroheating and electromagnetic processing*).

 **DANGER**



Dangerous voltage

The connecting wires will lose their flexibility and become brittle during operation.

There is a danger of breaking and loss of the insulating property.

- ➔ After installation and initial operation, do not move or relocate/re-lay the connecting wires.

-
- ➔ Max. temperature inside the connecting wires: 900°C.
 - ➔ Monitoring of the max. admissible emitter temperature of 950°C.
 - ➔ Adherence to the maximal rated currents.
 - ➔ Stick to the intended routing paths inside a module.



The connecting wires must not be routed in bundles.

If connecting wires are bundled, there is a danger of overheating already at substantially lower temperatures.

Higher temperatures or currents will destroy the connecting wires.

The connecting wires installed are not designed to withstand heavy vibration or cyclic movement.

If the infrared emitters are to be moved along with a device, the connecting wires must be connected to terminals that move along with the emitters.

Connecting wires which are suitable for being moved can then be installed from there.

-
- ➔ The plant or machine must be protected against leakage currents using suitable means.

Temperature of the quartz glass tube

Max. admissible temperature of the infrared emitter: 950°C

WARNING



Warning of overheating

Irreversible damage to the quartz glass tube will occur if the temperature is exceeded:

- ➔ The max. admissible temperature of the quartz glass tube must not be exceeded for a long time.
- ➔ Use temperature-monitored infrared emitters to avoid overheating.
- ➔ Ensure observance of the temperature limit by using a suitable control unit.

Humidity, water

WARNING



Dangerous voltage

The infrared emitters and their connecting wires only have a basic insulation: protection against direct contact.

Infrared emitters are not intended for use in water.

Dripping water can be tolerated if electrical safety is guaranteed by the plant.

- ➔ Arrange the infrared emitters in the machine in such a way that the infrared emitters and the connecting wires cannot be touched and are not accessible.
- ➔ Include the infrared emitter mounting/retainer in the protective conductor system of your plant.

Contamination of ultra-pure liquids or gases by quartz glass, socket, cement or connecting wires is not ruled out.

- ➔ Make sure that contamination does not occur.

5 Transport

Danger of breaking

CAUTION



Warning of injury to hands

Infrared emitters consist of fragile quartz glass that forms sharp edges when it breaks.

- ➔ Wear protective clothing.
- ➔ Prevent the following:
 - Heavy vibration
 - Shock
 - Contact with other machine parts
 - Contact with the substrate
- ➔ Transport the infrared emitters only in their original packaging.

Fingerprints, fat or sweat on the quartz tube will result in devitrification and premature failure of the infrared emitter.



- ➔ Do not touch the infrared emitters with your bare hands.
- ➔ Wear gloves.

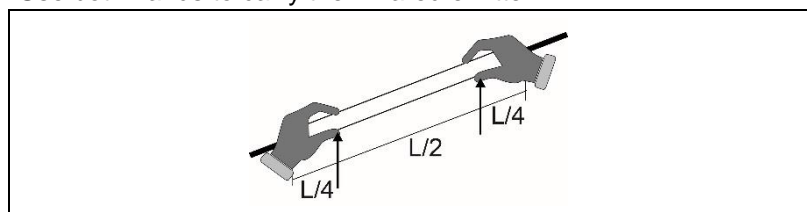
We recommend wearing clean and powder-free latex gloves and clean textile gloves on top.

- ➔ Immediately change soiled gloves.

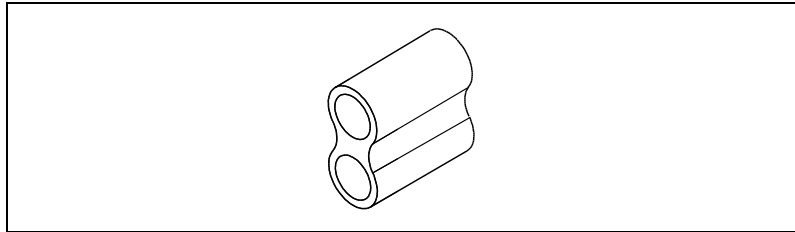
- ➔ Use the packaging of the infrared emitters to transport them to the place of installation.

Wear suitable personal protective equipment if the infrared emitter needs to be transported without its packaging.

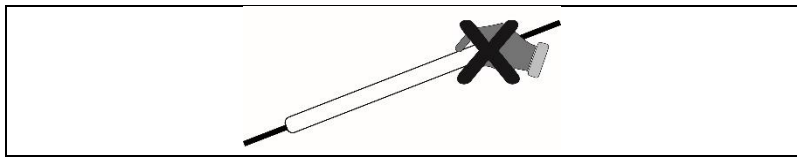
- ➔ Use both hands to carry the infrared emitter.



- ➔ Carry twin-tube infrared emitters in such a way that both channels of the infrared emitter are arranged on top of each other as shown in the drawing. This is to prevent the emitter from bending and breaking.



- ➔ Only touch the glass body when carrying the infrared emitter. Never use the connecting wires, pinches or ceramic parts to carry the infrared emitter.



- ➔ Avoid any pressure on the seal.

6 Mounting

WARNING



Dangerous voltage

The screws and nuts used to mount the emitter may be live due to the leakage current of the infrared emitters.

- ➔ Install the infrared emitters in such a way that the emitter mount will not be accessible and cannot be touched during operation.

CAUTION



Warning of crushing injury to hands

Hands may be crushed if the clamp mounting is handled incorrectly.

- ➔ Wear cut-resistant gloves.

CAUTION



Warning of cutting injury

Infrared emitters may break if handled incorrectly. The splinters and sharp edges created pose a danger of injury.

- ➔ Do not damage the infrared emitter.
- ➔ Wear cut-resistant gloves.



The installation of the infrared emitters is described in the instruction manual for the system.

- ➔ Observe the system's instruction manual.

WARNING



Dangerous voltage if filament is bare

For medium-wave infrared emitters, the ceramic sockets must additionally be fastened.

This may be done with the metal bracket supplied. This will prevent the socket from getting detached from the emitter tube during operation and the filament from exiting the emitter.

6.1 Installing the emitter

- ➔ Route the connecting wires of the infrared emitters to the terminals.
- ➔ Do not bundle the connecting wires.
- ➔ Cut the connecting wires to the required length if possible. Press a wire-end sleeve onto the bare end of the connecting wire.
- ➔ Connect the connecting wires to the terminals provided for the purpose.



- ➔ After installation, clean all infrared emitters, see *chapter 7.1. Cleaning*
-

6.2 Check

- ➔ Following electrical installation, check the infrared emitters in acc. w. EN 60519-1, *Safety in electroheating installations – Part 1: General requirements*.

The infrared emitters have an output tolerance which is due to production conditions.

- ➔ Check the total power consumption for compliance with the specification after installation of the infrared emitters into a plant or machine.

7 Maintenance



Maintenance and repair work must be carried out only by authorised expert personnel.
Improper handling of the product will result in injury to persons and damage to property.

DANGER



Dangerous voltage

Risk of electric shock when working on live components.
Danger to life.

- ➔ De-energise the infrared emitters (disconnect from power supply).
 - ➔ Secure against restarting.
 - ➔ Check the infrared emitters are de-energised.
-

CAUTION



Hot surface

During operation and for a long time after switch-off, the infrared emitters and their surroundings have very hot surfaces.

Contact with the hot surface will cause severe burns.

- ➔ After switching them off, wait a sufficient time for the infrared emitters to cool down.
-

CAUTION



Warning of cutting injury

Infrared emitters may break if handled incorrectly.
The splinters and sharp edges created pose a danger of injury.

- ➔ Do not damage the infrared emitter.
 - ➔ Wear cut-resistant gloves.
-

Heraeus Noblelight infrared emitters do not require maintenance.

However, we recommend the scheduling of intervals for visual inspection and, if necessary, subsequent cleaning.

- ➔ Adjust the inspection intervals to the risk and degree of soiling in the process environment.

7.1 Cleaning

Proper function of the infrared emitters is guaranteed only if the quartz glass is clean.



- ➔ Do not touch the infrared emitters with your bare hands!
- ➔ Wear suitable gloves.

Fingerprints on the quartz tube will result in devitrification and premature failure of the infrared emitter.



- ➔ Do **not** clean the reflector side of the infrared emitter.
-

- ➔ Infrared emitters need to be cleaned to remove any soil and finger sweat prior to initial operation and following any maintenance. Use the cleaning cloth enclosed with our delivery or a clean cloth (no finish) soaked e.g. with ethanol.

8 Disposal

RoHS II The infrared emitter is subject to Directive 2011/65/EU (RoHS II, category 5, *Lighting equipment*) and contains none of the hazardous substances specified in its Annex II in concentrations higher than the admissible maximum in homogeneous materials:

- Lead (0.1%)
- Mercury (0.1%)
- Cadmium (0.01%)
- Hexavalent chromium (0.1%)
- Polybrominated biphenyls (PBB) (0.1%)
- Polybrominated diphenyl ethers (PBDE) (0.1 %)

The infrared emitter complies to RoHS II.

WEEE The infrared emitter is not subject to Directive 2012/19/EU (WEEE) because the Directive does not apply to filament lamps.

- ➔ Dispose of the infrared emitters in compliance with the applicable local or national statutory regulations.