

# SUNRAD INCANDESCENCE EMITTERS

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## 1.0 SUNRAD INCANDESCENCE EMITTERS

### 1.1 OPERATING PRINCIPLE

The SUNRAD incandescence emitter is a radiance heating apparatus which is best suited for installation in high places. The emitter consists of a venturi tube and a gas injector: the speed of the gas injection causes a depression that takes in the amount of air needed for correct combustion. The air-gas mix is emitted in the mixing chamber and is spread out on the entire surface of the heat exchanger. The latter consists of a series of ceramic plates, the number of which varies according to the power of the machine which, when brought to high temperatures, overheat and radiate the surface below. The SUNRAD emitter is outfitted with a reflector which reflects, in the area to be heated, that radiating heat which would otherwise be dispersed in useless directions. The control apparatus, solenoid valve and the electrical circuits are assembled in sequence on the gas feeding tube of the emitter. When the control system gives the ok the flame is lit by a block of electrodes which act also as an ionized flame control. The combustion products are expelled at the sides of the emitter.

### 1.2 CONSTRUCTIVE ASPECTS

#### THE RADIANT UNIT

The radiant unit is the true emitting part of the SUNRAD machine. It consists of:

- 1/2"-gas feeding tube outfitted with a conical semi-union
- Special venturi-type burner, single or double according to the models
- Aluminized mixing chamber, single or double according to the models
- Series of holed ceramic plates, assembled on a refractory steel frame fastened to the mixing chamber. The group of plates makes up the emitting surface.

#### THE CONTROL UNIT

The control unit consists of:

- 1/2"-galvanized steel gas feeding tube
- SIT 840 gas solenoid valve (for single-stage emitters).
- SIT 843 gas solenoid valve (for two-stage emitters).
- CE191 electronic equipment
- Electrode block consisting of starting, mass and flame observation electrodes.

#### THE REFLECTOR

In heating systems with SUNRAD emitters, given the possibility of installation in high places, the reflector takes on an important role. For this reason FRACCARO S.r.l. uses a special steel reflector. The reflector is assembled in the lower part of the emitter in such a way to block the dispersion of heat towards the sides.

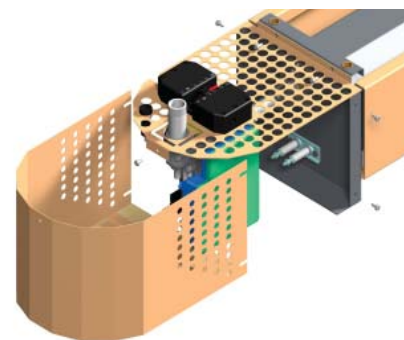


Fig. 1 Close-up of radiant unit

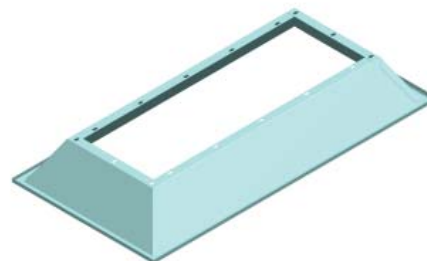


Fig. 2 Close-up of steel reflector



## 2.0 SUNRAD EMITTERS FOR INDUSTRY AND PROCESS APPLICATIONS

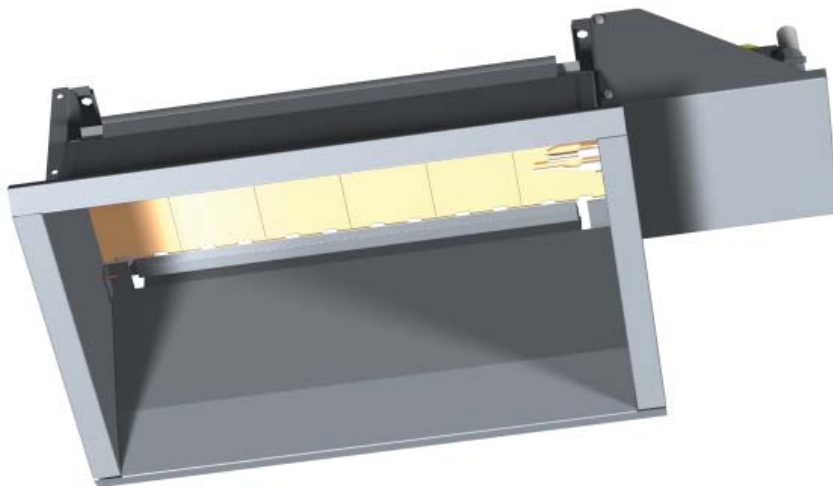


Fig. 3 SUNRAD Emitter Mod. IEM10S2, 10 kW, with single radiant unit

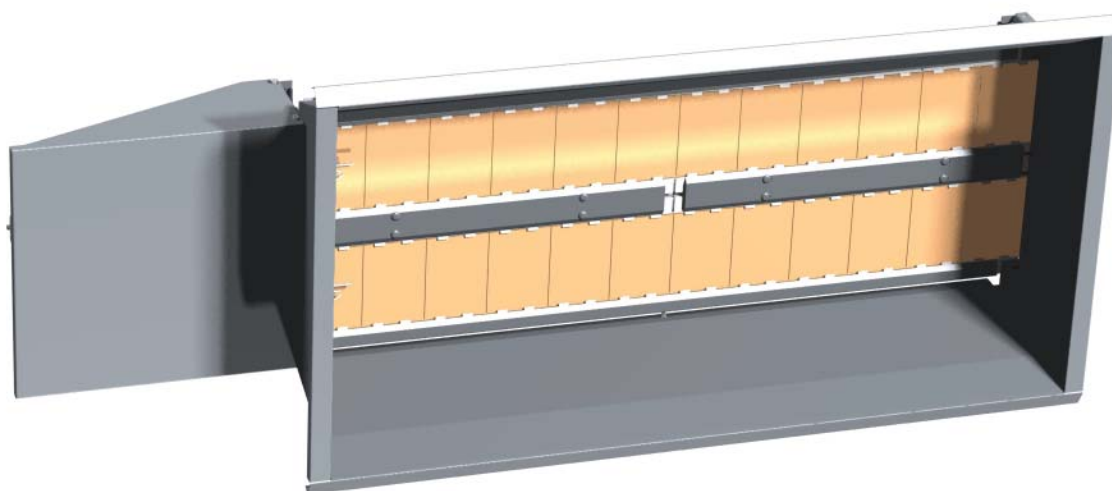


Fig. 4 SUNRAD Emitter Mod. IEM40S2, 40 kW, with double radiant unit



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## 2.1 COMPONENTRY OF SUNRAD EMITTERS

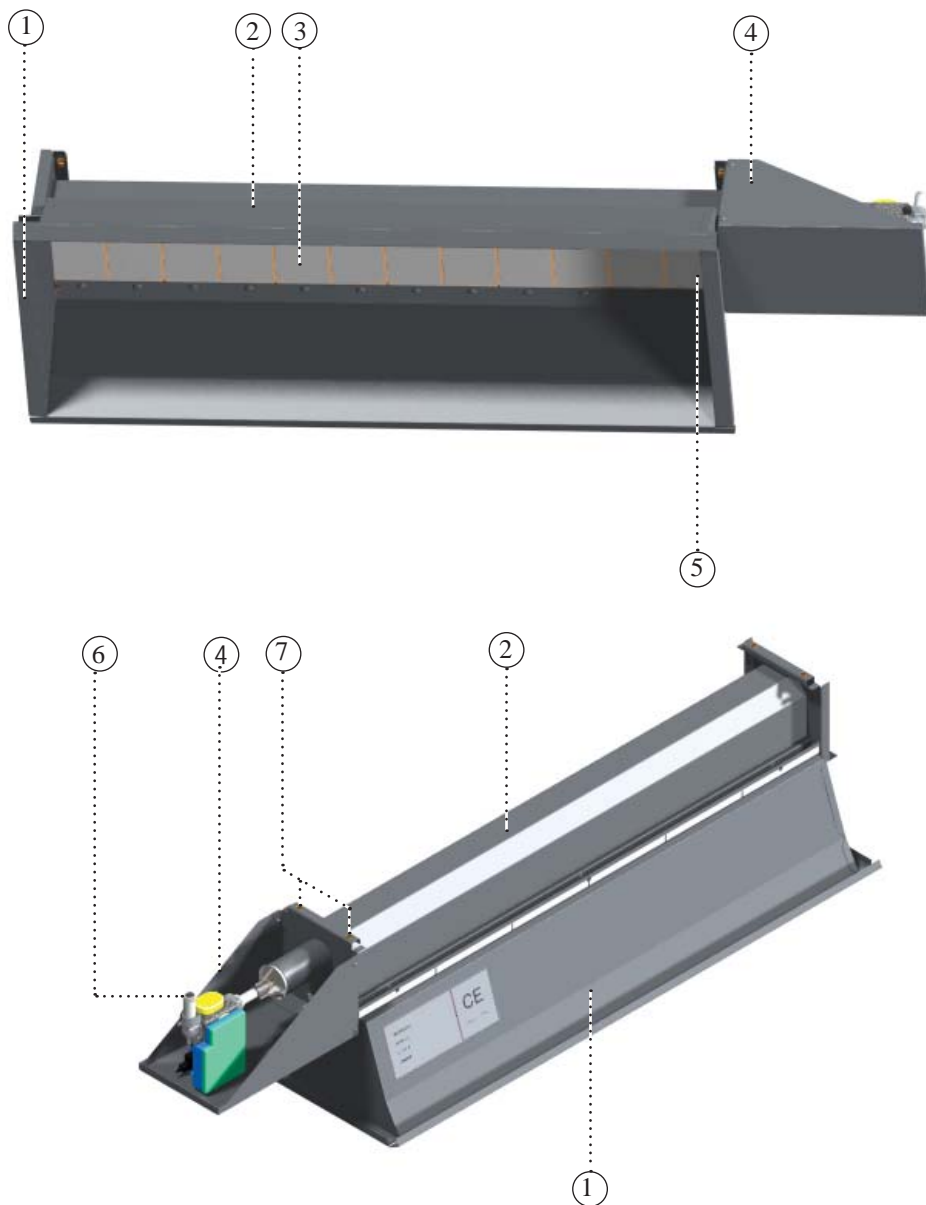


Fig. 5 SUNRAD Emitters for industry and process applications

MODEL	POWER min / max [kW]
IEM10 / IEM10 B	10
IEM10S2 / IEM10BS2	7 / 10
IEM20 / IEM20 B	20
IEM20S2 / IEM20BS2	14 / 20
IEM30	30
IEM30S2	25 / 30
IEM35 / IEM35 B	35
IEM35S2 / IEM35BS2	30 / 35
IEM40	40
IEM40S2	28 / 40

**Key:**

- 1 = Reflectors
- 2 = Aluminized steel mixing chamber
- 3 = Holed ceramic plate
- 4 = Valve protection cover
- 5 = Electrode group: starter, ionization and grounding
- 6 = Gas connection
- 7 = Fastening staff

Tab. 1 Models and thermal power of SUNRAD emitters for industry and process applications



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## 2.2 EXTERNAL DIMENSIONS OF SUNRAD EMITTERS

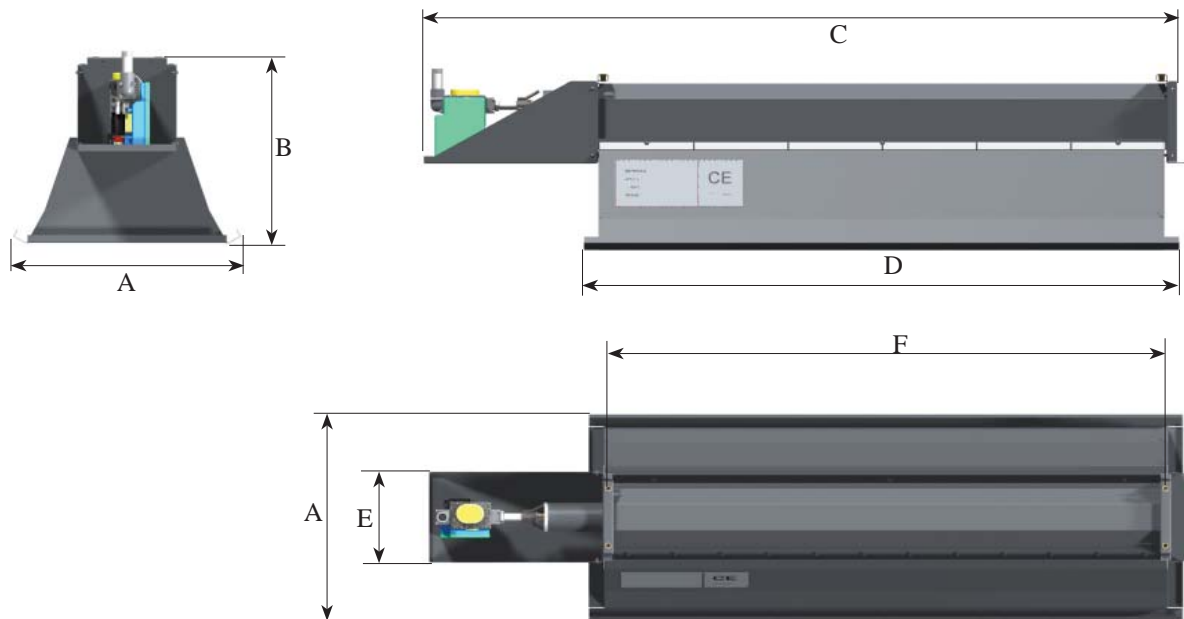


Fig. 6 External dimensions of SUNRAD emitters for INDUSTRY and PROCESS APPLICATIONS with single radiant unit

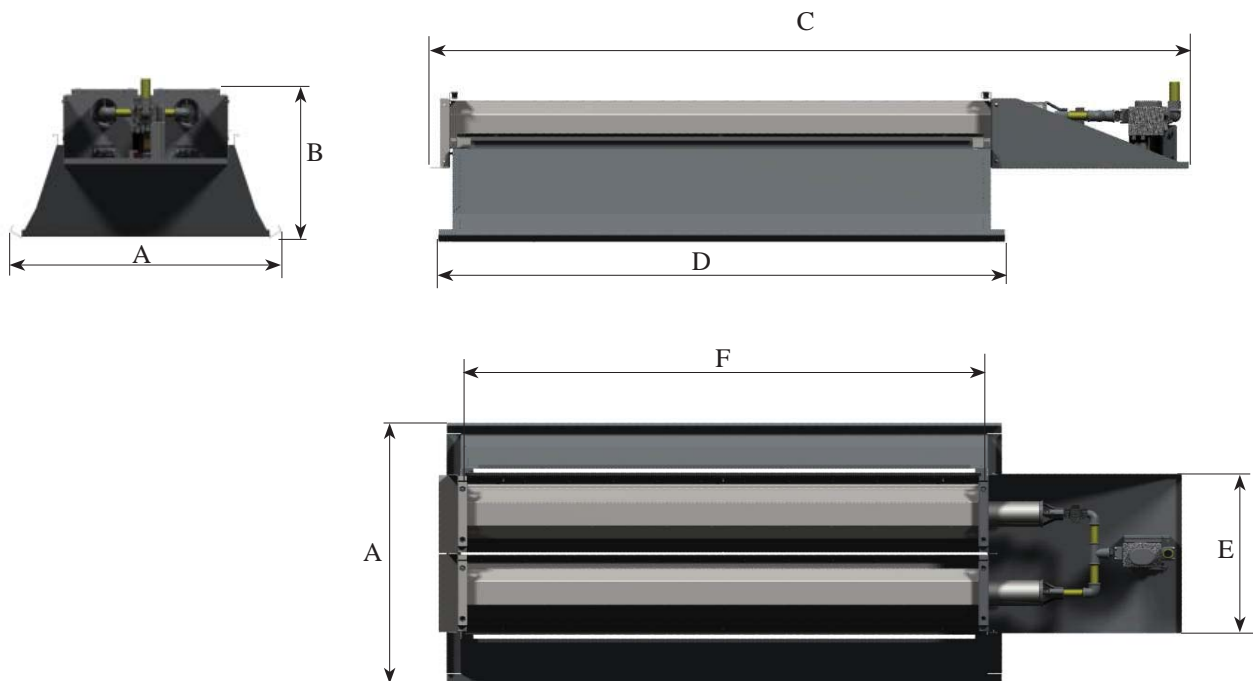


Fig. 7 External dimensions of SUNRAD emitters for INDUSTRY and PROCESS APPLICATIONS with double radiant unit

		A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
Models with single radiant unit	<b>IEM10 - IEM10S2 - IEM10 B</b>	429	323	828	607	189	535
	<b>IEM20 - IEM20S2 - IEM20 B</b>	429	323	1482	1156	189	1084
	<b>IEM30 - IEM30S2</b>	429	353	1743	1522	189	1450
	<b>IEM35 - IEM35S2 - IEM35 B</b>	429	353	2031	1705	189	1633
Models with double radiant	<b>IEM40 - IEM40S2</b>	615	323	1547	1156	375	1084
	<b>IEM60 - IEM60S2</b>	615	353	1808	1522	375	1450

Tab. 2 External dimensions of SUNRAD emitters for industry and process applications



### 3.0 DESIGNING WITH SUNRAD

#### 3.1 DESIGNING SYSTEMS WITH SUNRAD EMITTERS

Designing a heating system first of all requires calculating the loss of heat in the environment to be heated at a certain internal comfort temperature. The thermal power to be installed in the area must be greater than the thermal load of dispersion that has just been calculated.

#### DISTANCES FROM COMBUSTIBLE MATERIAL IN THE RADIATION FIELD

The emitters must be arranged in such a way that in the radiation field, between the radiant surface and the structural elements a surface temperature that could be dangerous is not generated. If there is combustible material to be stored, this condition must be further guaranteed by opportune provisions, such as warning plates and limitation devices and the like.

#### DISTANCES FROM COMBUSTIBLE MATERIAL OUTSIDE THE RADIATION FIELD

Outside their radiation field the emitters must be installed far from combustible material which, with a nominal thermal load, cannot have temperatures above 50° C.

#### MINIMUM DISTANCES FROM PEOPLE

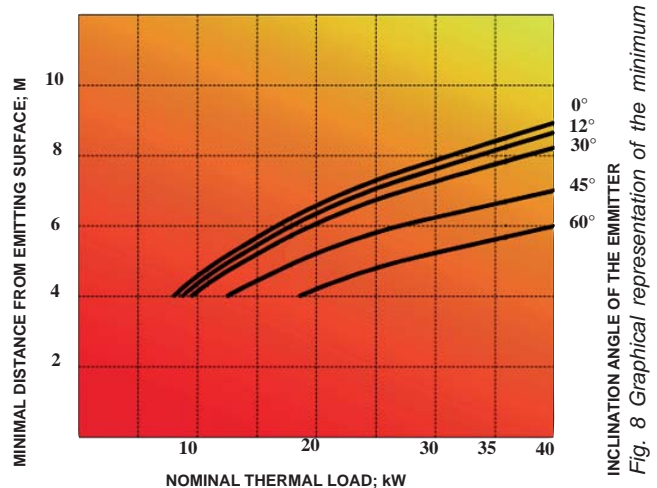
The emitters must be arranged in such a way that the people in the radiation field are not exposed to an unhealthy thermal action. Such a principle is assured if the minimum suspension heights indicated in the drawing are respected. The minimum suspension heights indicated are for an air temperature of 10 °C. If there are different air temperatures, the minimum installation height is obtained by using the Correction Factor  $F_1$ .

$$H \text{ INSTALLATION MINIMUM} = H \text{ INSTALLATION MINIMUM WITH AIR AT } 10^{\circ}\text{C} \times F_1$$

$T_{\text{air}} [^{\circ}\text{C}]$	0	5	10	15
$F_1$	0,9	0,95	1	1,1

Tab. 3 Values of Correction Factor depending on air Temperature  $F_1$

It is advisable to respect the values indicated in figure 11, but it is necessary to verify the intake conditions case by case. In the case of emitters with power regulation (2 stages), the correction factor is not necessary for air temperatures over 10°C. In any case the suspension height must never be lower than 4mt.



suggested distance of the emitting surfaces according to the power of the emitter and the inclination angle.

#### EXAMPLE

A 20 kW Sunrad, with an inclination angle of 30°, ambient temperature 15°C

$$H_m = 6.5 \text{ m}$$

$$H_{m,30^{\circ}} = 6 \text{ m}$$

$$T_{\text{air}} 15^{\circ}\text{C}: F_1 = 1.1$$

$$H = 6 \times 1.1 = 6.6 \text{ m}$$



### 3.2 DISTANCES AND CENTER TO CENTERS DISTANCE OF SUNRAD EMITTERS

The heights and the distances between centres that enable reaching a good technical comfort are presented in the following.

MODEL	H [m]	CENTRE to CENTRE DISTANCE (I) MAX [m]	DISTANCE (D) MAX [m]
IEM10 - IEM10S2 - IEM10 B	12	10	5
IEM20 - IEM20S2 - IEM20 B	15	12	5
IEM30 - IEM30S2	18	12	6
IEM35 - IEM35S2 - IEM35 B	20	12	6
IEM40 - IEM40S2 - IEM40 B	22	14	7
IEM60 - IEM60S2 - IEM60 B	24	14	7

Tab. 4 Height, recommended centre to centre distances and maximum distances advisable for SUNRAD emitters.

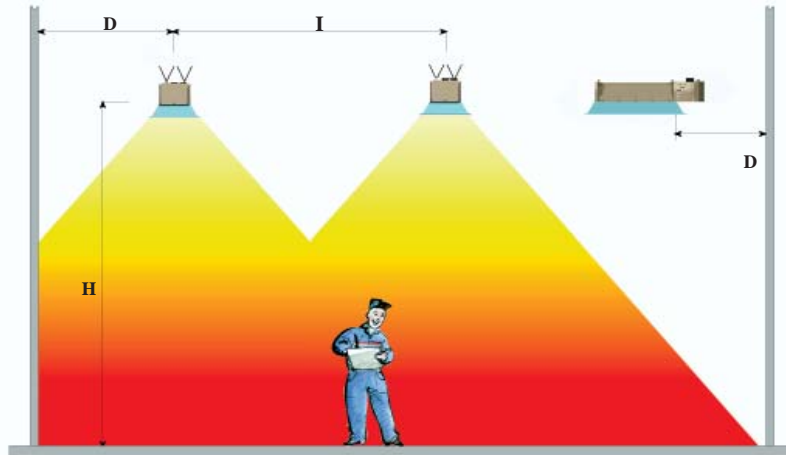


Fig. 9 Graphical representation of the distances/heights to be respected in the installation phase of the emitters

For the distances from combustible materials, we recommend respecting the minimum values indicated below.

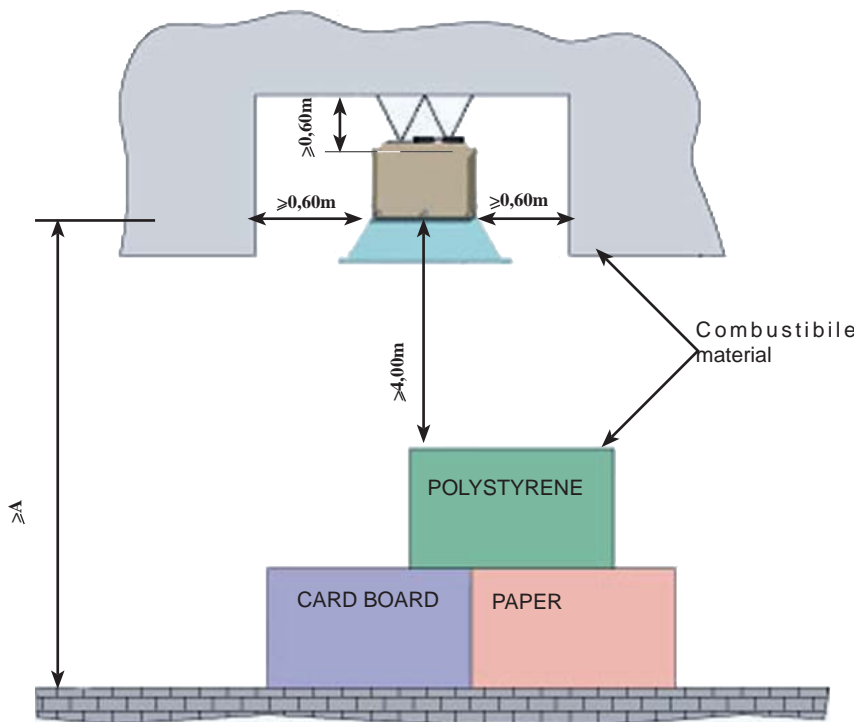


Fig. 10 Distance from combustible materials to be respected

MODEL	Minimum suggested height [m]
IEM10 IEM10S2 IEM10 B	5,2
IEM20 IEM20S2 IEM20 B	7,2
IEM30 IEM30S2	8,0
IEM35 IEM35S2 IEM35 B	8,5
IEM40 IEM40S2	8,9
IEM60 IEM60S2	10,8

Tab. 5 Minimum installation height from ground



### 3.3 INSTALLATION MODES

#### REGULATING THE ROOM TEMPERATURE

SUNRAD emitters enable quickly adapting the room temperature to the pre-set values (comfort temperature). The temperature is regulated by using the global probe located inside the area to be heated. It is important to stress that the global probe measures the average value between the air temperature and the radiant temperature, or exactly the thermal effect perceived by man (operating temperature). The regulation and command devices are dislocated in an opportune way inside the building in a central electrical box outfitted with a lock. The homogeneous regulation of the room temperature is not necessary if only work stations or limited areas of the rooms are to be heated.

#### INSTALLATION AREA

The area for installation must have a minimum air change of 10 m<sup>3</sup>/h for every kW of nominal thermal load installed and a volume not smaller than 10 m<sup>3</sup>/kW installed (according to the EN 13410 regulation).

There are no problems for installation if:

- 1) The area is separated from other areas by walls and ceilings in non-combustible construction materials.
- 2) The construction materials of the area, such as external walls, supports, floors, and parts of the roof, not to mention furniture, are made of non-combustible materials. This is not the case for windows and doors. If such construction elements are in the radiation field, the emitter must be installed according to the specifications in fig. 13.
- 3) The storage of dangerous quantities of combustible material is prohibited.

#### PROHIBITED INSTALLATION AREAS

The emitters cannot be installed:

- a) in houses and offices, nor in areas which do not respect the heights, measurements and/or uses previously mentioned;
- b) in areas which, after working, accumulate dust or steam which could cause a fire and explosions;
- c) in areas connected to areas described in point b) by means of openings, or which have openings towards external areas where there are inflammable dust or steam.

#### CEILING INSTALLATION

To install the SUNRAD incandescence emitters it is necessary to:

- look at the system plan;
- assemble the emitter as specified in the instruction and installation manual after having checked that it is intact;
- check on the identification plate that the radiant unit is set to run with the type of gas available.

Following the plan, arrange the anchors to suspend the emitters on the structure in the room. To avoid the dangerous rocking of the emitters it is advisable to suspend them on four slightly spread out points with respect to the radiant unit plant. In any case, it is possible to anchor it only on two points. Hook the chain onto the holes on the radiant unit frame by means of S hooks (or a similar system), lift the radiant units and hook the chains onto the prearranged supports.



### 3.4 BURNT GAS EXHAUST

Burnt gas exhaust, according to the EN 13410 regulation, can come about in three ways:

- a) thermal evacuation of the combustion/air mix products;
- b) mechanical evacuation of the combustion/air mix products;
- c) natural airflow.

It is important that the installation area for the heating machines must have a volume above  $10\text{m}^3$  for every kW of installed nominal thermal capacity.

#### VENTILATION BY MEANS OF THERMAL EVACUATION

Thermal evacuation means the natural evacuation due to hot air rising which occurs through openings placed above the SUNRAD emitters. The horizontal distance between one heating device and an opening for stale air evacuation must not be greater than six times the height of the opening if it is on the wall, while it must not be greater than three times the height of the opening if it is on the roof. Ventilation by means of thermal evacuation will be enough if  $10\text{ m}^3/\text{h}$  of stale air per kW of installed thermal capacity come out of the area of installation. When necessary, the evacuation capacity of stale air produced in other ways must be taken into consideration: the surface and the number of openings must therefore be calculated according to the greatest of these air capacities (for calculation methods of the minimum diameter of the openings and for any further study, see the entire text of the EN 13410 regulation).

#### VENTILATION BY MEANS OF MECHANICAL EVACUATION

In the case of evacuation by means of mechanical ventilation, the intake points must also be placed above the SUNRAD emitters; apart from that only fans that move vertically must be used. The heating machines can be started only when the evacuation of stale air is assured. The horizontal distance between one heating machine and a fan must not be greater than six times the assembly height of the fan if it is on a wall while it must not be greater than three times the assembly height of the fan if it is on a roof. Ventilation by means of mechanical evacuation will be enough if  $10\text{ m}^3/\text{h}$  of stale air per kW of installed thermal capacity comes out of the installation area. When necessary, the evacuation capacity of stale air produced in other ways must be taken into consideration: the capacity of the ventilators is therefore calculated according to the greatest of these air capacities (see EN 13410).

#### VENTILATION BY MEANS OF NATURAL AIR FLOW

Heating machines fed by gas can run without any special evacuation system if the combustion products are evacuated to the outside by means of a sufficient change of natural air in the installation area". This is verified in the following cases:

- buildings with natural air change greater than 1.5 volumes per hour;
- buildings with a quantity of operative thermal capacity lower than  $5\text{ W}/\text{m}^3$ .



## AIR FEED

The air feed openings must be placed under the SUNRAD emitters and the sum of the transversal sections not blocked by the air feed openings must not be less than the sum of the transversal sections not blocked by all the evacuation openings. Aerification openings are necessary for air feed. To avoid air draught phenomena, the openings must be located at least 2 m above the floor but below the suspension height of the emitters. Slots and joints that cannot be modified in their section can also be used as aerification openings.

### Key:

- 1 Evacuation eye with mechanical ventilation
- 2 Incandescence emitter

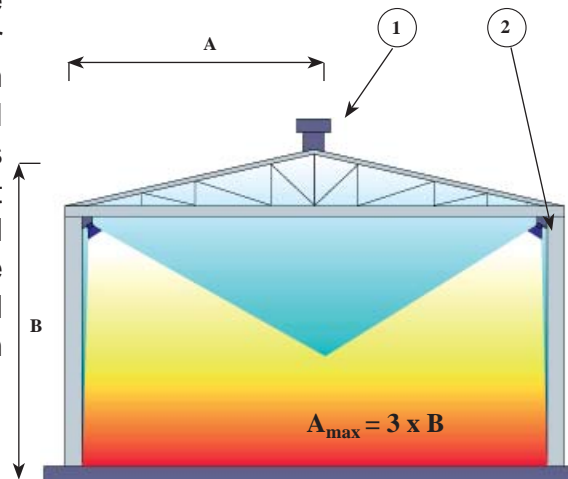


Fig. 11 Example of installation: evacuation eye with mechanical ventilation.

## 3.5 FUNCTIONING

### SETTING AT WORK

The systems must be set at work for the first time by FRACCARO S.r.l. or by an authorized assistance centre. In this context all the regulation, command and safety devices must be checked. All of the connections in the electrical circuit must be checked and also the provisions for the protection against exhaust and the preparations for both the aerification openings and the ones for burnt gas/stale air exhaust. The person in charge of the system must be informed on the running of the system.

### TESTING AND ANNUAL MAINTENANCE

During testing and maintenance the following tasks must be carried out:

1. Cleaning the emitters, in particular the radiant unit in holed ceramic.
2. Testing the tightness of the seal of the gas connections.
3. Testing the running of the starter device and the flame control.
4. Testing the running of the regulation and command devices and of the command apparatus.
5. Checking the pressure at the nozzle.
6. Checking all the electrical connections.
7. Checking the aerification openings and the openings for burnt gas/stale air.
8. Checking the indication plates, if present.

In case of anomalies, repairs must be made or parts changed. Repair work on self-regulating parts and flame control devices and other safety devices can only be carried out by the manufacturer or by a technician they put in charge. The expert in charge of maintenance, on the other hand, can change parts or groups of the same type.



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### 3.6 GAS FEED

The gas feeding system is made by professionally qualified personnel and in compliance with the laws in force in each country it is installed in. Size the gas feeding pipe according to the necessary capacity and pressure, providing for the safety and control devices required by law. The emitters must not be rigidly fastened to the gas piping.

### REGULATING THE GAS PRESSURE

The emitters must run with the gas inlet pressure well-regulated in the case of working pressure higher than 30 mbar. A well-designed system does not require a pressure regulator on every single emitter, but a pressure regulator for a group of emitters.

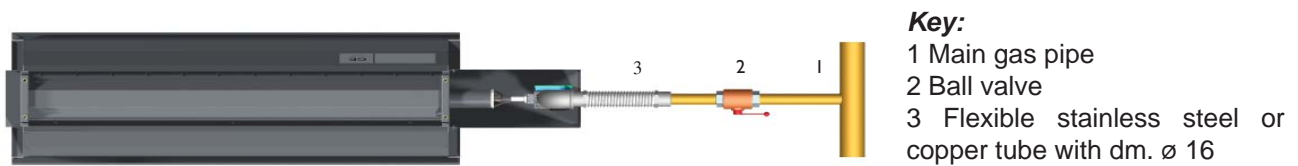


Fig. 12 Diagram of the connection of the SUNRAD emitter to the gas network

### 3.7 EMITTER ELECTRICAL CONNECTIONS

The electrical cables must be connected as follows:

- Black cable, terminal L1 = feeding phase
- Brown cable, terminal T1 = II° stage feeding phase (only for two-stage models)
- Blue cable, terminal N = feeding neutral
- Grey cable, terminal T2 = burner running signal
- Red cable, terminal S3 = burner blocked signal
- Yellow-green cable, terminal  $\perp$  = grounding conductor

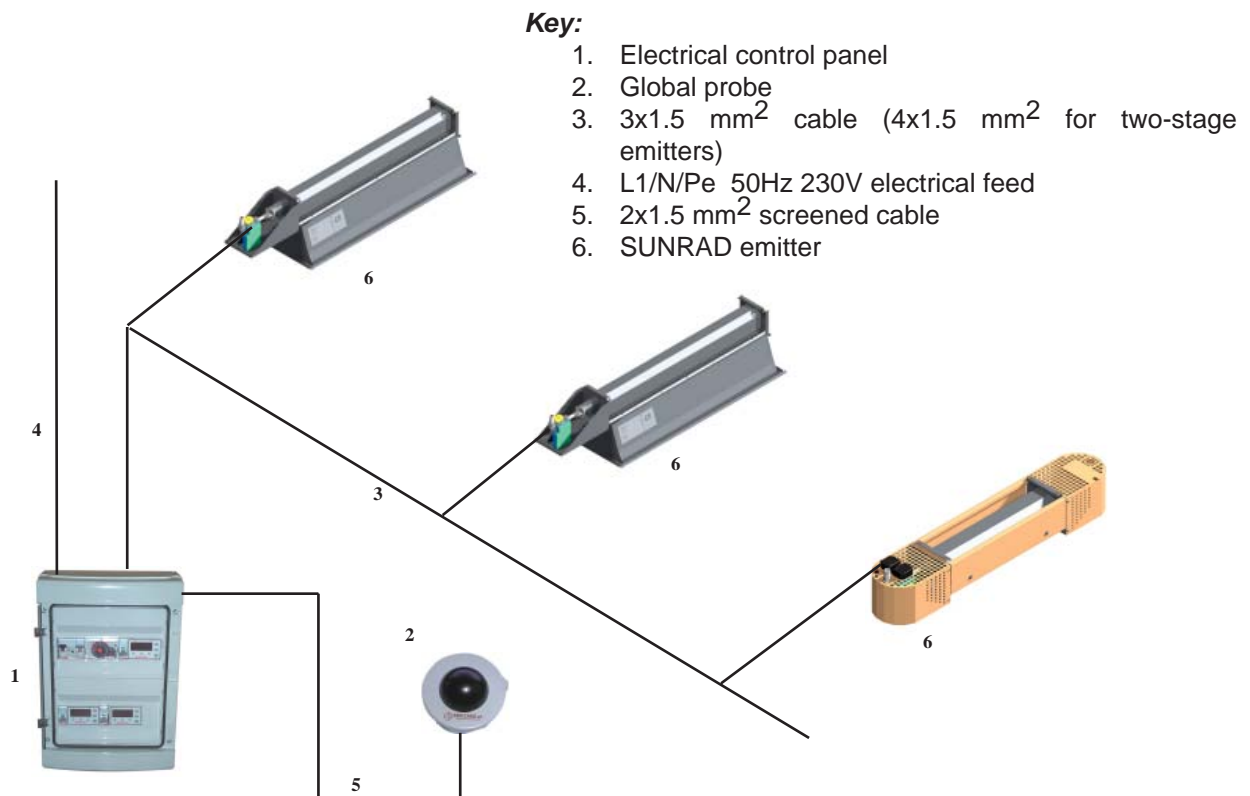


Fig. 13 Diagram of electrical feed and control of various SUNRAD emitters



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## 4.0 SUNRAD EMITTERS FOR PLACES OF WORSHIP

### 4.1 CHURCHES: DETAILS AND BENEFITS

In places of worship heating has always created considerable problems due to specific needs that they all have in common:

Considerable height.

Particular use that requires only a few hours a day of heating.

The need to avoid noise and resonance.

The impossibility, in more occasions than not, of intervening on the structures.

Respect for the aesthetics of the area.

Absolute attention to the beginning or aggravation of problems concerning humidity on the structures, seeing that they are often old buildings.

The presence of art work (statues, paintings, frescoes, mosaics, etc.), therefore the need to modify as little as possible the microclimate created through time in the area.

The need to manage the heating service in an absolutely economical way.

This typology of situations indicates the need to use a radiance system, in that the noted defects of a conventional hot air heating system (stratification, movement of dust, little homogeneity of temperature, etc.) in these particular places are highlighted. Radiance heating with Sunrad emitters has radiant and structural features that make it ideal for heating places of worship. SUNRAD emitters for places of worship join particular and specific aesthetic care with advanced technical features. For this reason they have been declared compatible by various Italian Superintendence of Environmental and Architectural assets.



Fig. 14 SUNRAD emitter Mod IECH10S2 for worship places



## 4.2 COMPONENTRY AND EXTERNAL DIMENSIONS OF SUNRAD EMITTERS

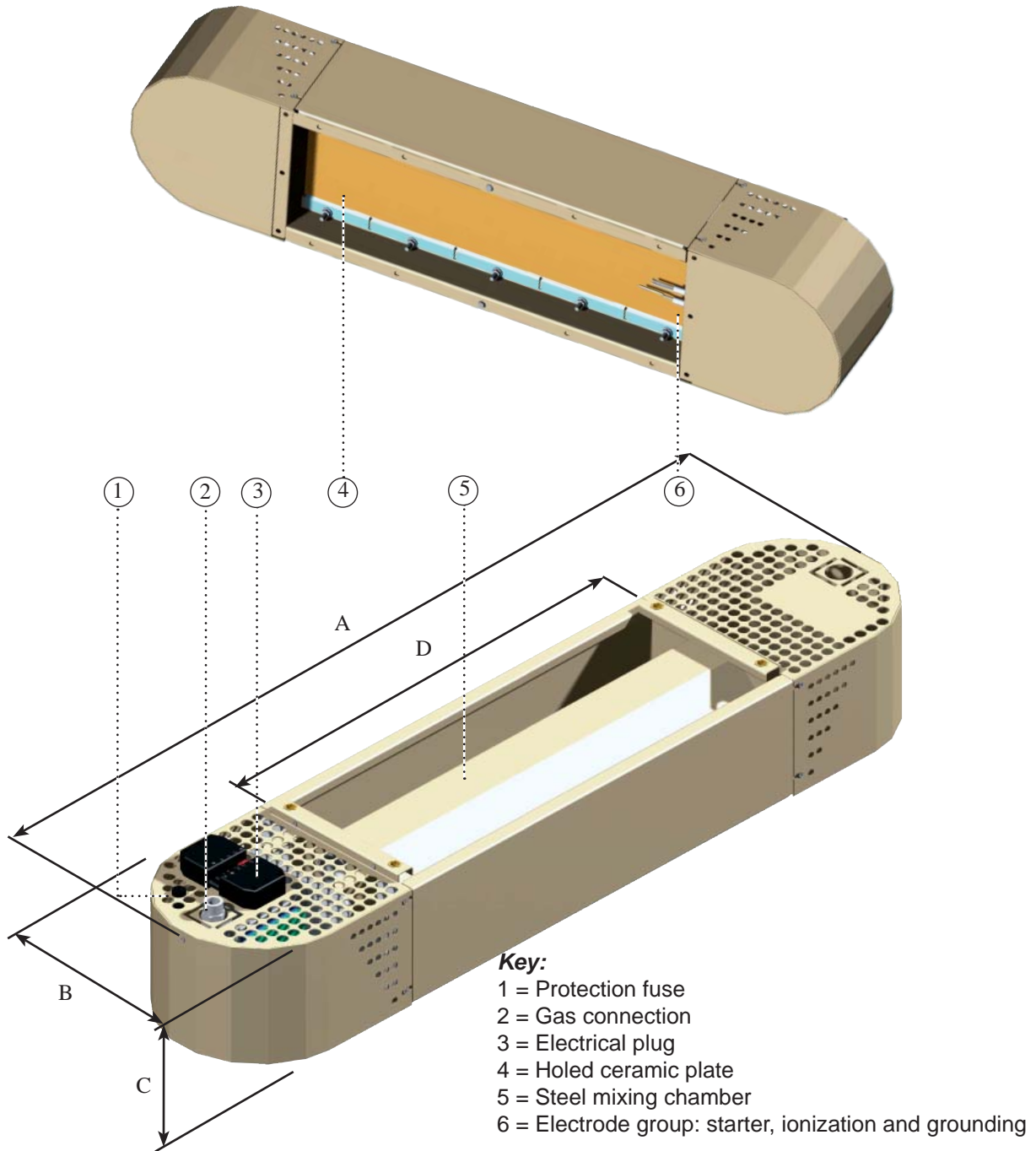


Fig. 15 Componentry and external dimensions of SUNRAD emitters for worship places

MODEL	POWER min / max [kW]	A [mm]	B [mm]	C [mm]	D [mm]
IECH10	10	1046	200	180	535
IECH10S2	7 / 10				
IECH20	20	1084			
IECH20S2	14 / 20				
IECH30S2	30	1450		192	
IECH30S2	25 / 30				

Tab. 6 Models, thermal power and external dimensions of SUNRAD emitters for worship places



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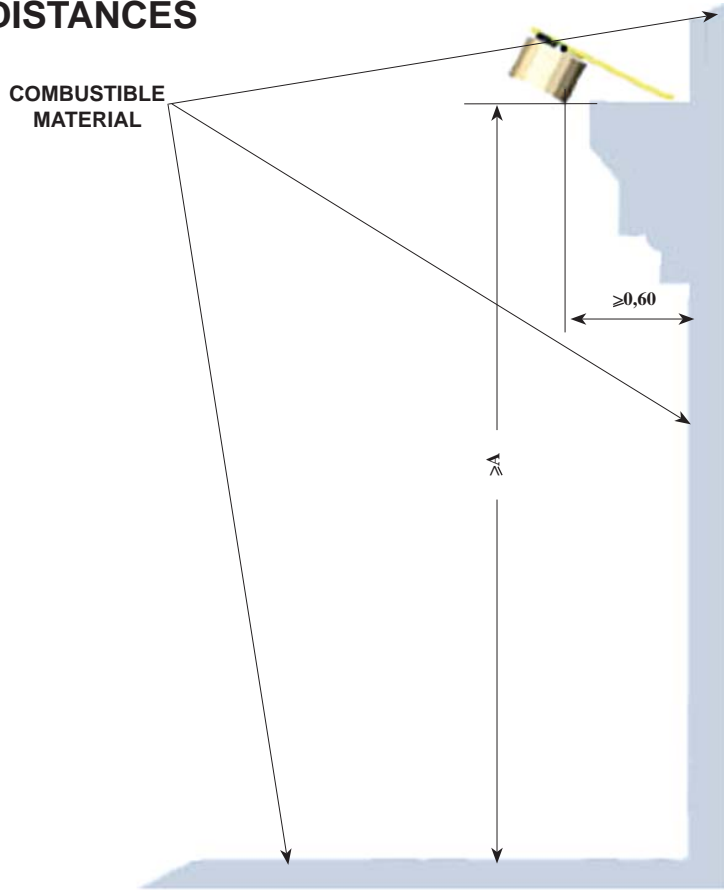


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### 4.3 DISTANCES



Attention: the minimum distance is purely indicative. The real values need to be verified from case to case based on the type of building and the inclination of the installation. Please, refer to our Technical Department for a correct evaluation.

MODEL	Minimum suggested height [m]
IECH10 - IECH10S2	5,2
IECH20 - IECH20S2	7,2
IECH30 - IECH30S2	8,0

Tab. 7 Minimum recommended installation height from the ground

Fig. 16 Recommended distances for the installation of SUNRAD emitters in places of worship, above all if combustible materials are present.

### 4.4 INSTALLATION EXAMPLES



Fig. 17 SUNRAD emitters in S.Lorenzo in Lucina at Rome



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## 4.5 VENTILATION

The dimensions and the position of the openings for the natural change of air and the evacuation of combustion products must be defined according to the regulation EN 13410 (see paragraph 3.4)

## 4.6 GAS FEED

The gas feeding system is made by professionally qualified personnel and in compliance with the laws in force in each country it is installed in. Size the gas feeding pipe according to the necessary capacity and pressure, providing for the safety and control devices required by law. The emitters must not be rigidly fastened to the gas piping.

**Key:**

- 1 Main gas pipe
- 2 Ball valve
- 3 Flexible stainless steel or copper tube with dm.  $\varnothing$  16
- 4 SUNRAD emitters

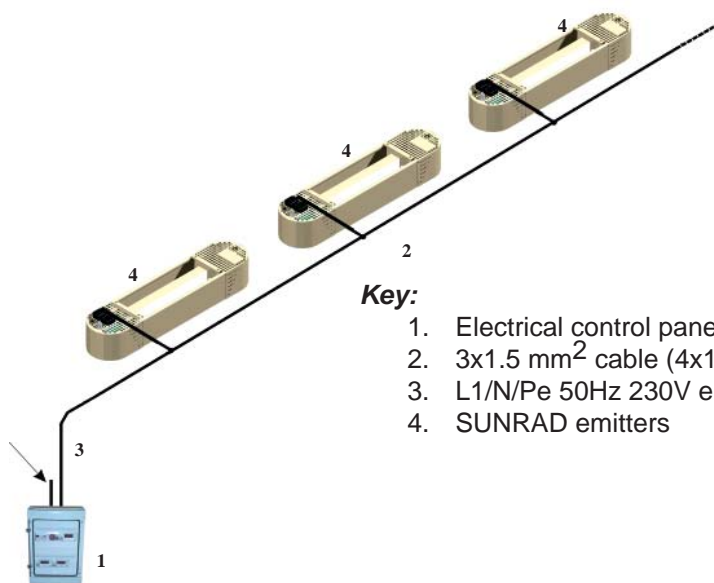


Fig. 18 Diagram of the connection of the SUNRAD emitter to the gas network

## 4.7 ELECTRICAL CONNECTIONS

The electrical cables must be connected as follows:

- Black cable, terminal L1 = feeding phase
- Brown cable, terminal T1 = II° stage feeding phase (only for two-stage models)
- Blue cable, terminal N = feeding neutral (for all electrical network)
- Grey cable, terminal T2 = burner running signal
- Red cable, terminal S3 = burner blocked signal
- Yellow-green cable, terminal  $\perp$  = grounding conductor



**Key:**

- 1. Electrical control panel with two switches for every emitter
- 2. 3x1.5 mm<sup>2</sup> cable (4x1.5 mm<sup>2</sup> for two-stage emitters)
- 3. L1/N/Pe 50Hz 230V electrical feed
- 4. SUNRAD emitters

Fig. 19 Diagram of feed and control of various SUNRAD emitters



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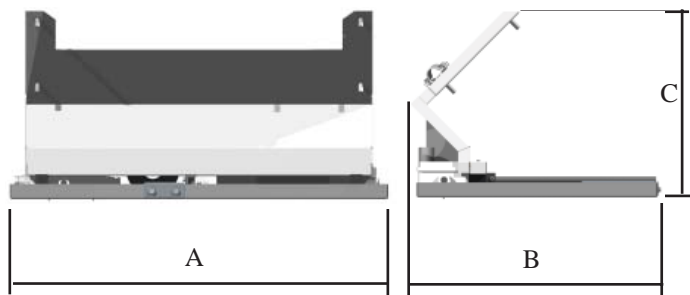
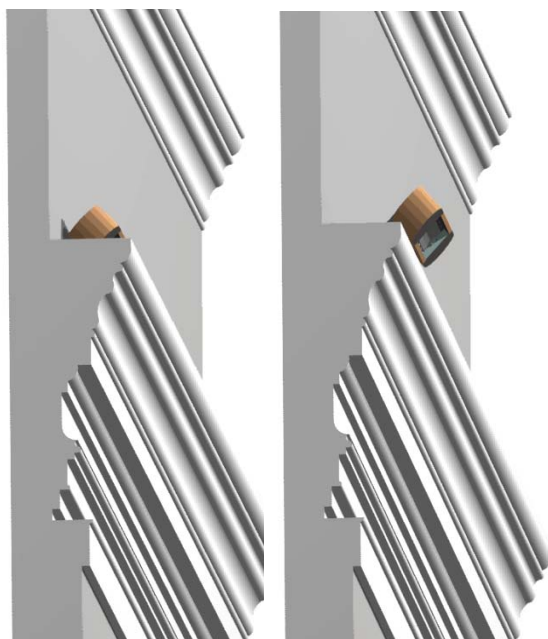
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## 4.8 USE OF MOBILE SUPPORTS FOR THE SUNRAD FOR WORSHIP PLACES

The mobile supports can be used on cornices or flat surfaces and make the Sunrad get hidden when not in use. The integrated protection does not allow the start-up of the Sunrad until the machine is completely out of the cornice. For the models IECH 10, 20 and 30 kW the length of the support can be 400 or 500 mm (depending on the available room on the cornice).

The gas and electrical connections must be realized according to the following drawings. Fix the support at a minimum distance of 30 mm from the rear wall (when the Sunrad is in off position) in order to leave enough space for the gas hose. Make sure that there are no obstacles and enough space to let the support move.

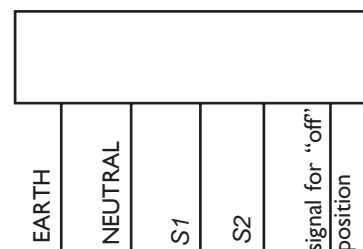
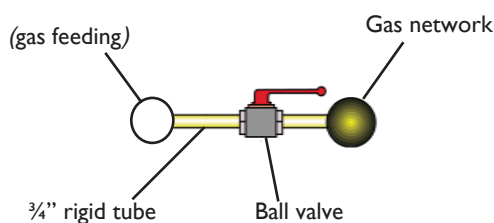
**The gas hose must move with no risk of getting caught.**



Mobile support	Sunrad	A (mm)	B (mm)	C (mm)	D (mm)	Mobile support weight (kg)
SSC010A	IECH10	626	430	300	574	17
SSC010B	IECH10S2		530			19
SSC020A	IECH20	626	430	300	1123	20
SSC020B	IECH20S2		530			22
SSC030A	IECH30	626	430	300	1490	21
SSC030B	IECH30S2		530			23

### GAS AND ELECTRICAL CONNECTIONS WITH THE MOBILE SUPPORT

Use a fix steel pipe size 3/4" with no flexible connections according to the norm flexible gas connection 1/2"



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## 5.0 COMFORT AND THERMOREGULATION

The regulation of the room temperature in radiance heating systems is a relevant factor in the well-being of individuals and in the reduction of management costs. Since it is the operating temperature, or the average between the air temperature and the average radiant temperature of the room surfaces, that generates the sensation of thermal comfort, it is clear that using a common room thermostat would only obtain the measurement of the air component and the strong radiant component would be excluded, thus greatly underestimating the real sensation of comfort. Consequently the system would function only until reaching the set air temperature, with obvious energy waste and uncomfortable thermal sensations. Fraccaro S.r.l., following its experience in the field of radiance, has realized an efficient electronic thermostat called GLOBOTHERMOSTAT. The globothermostat is equipped with a special electronic sensor located inside a black-varnished copper semisphere and outfitted with air passages. This sensor is connected to an electronic group which, with the precision of 0.1°C, provides the average operating temperature. The globothermostat, with its 2-figure display and function keys to set the desired temperature, is an absolutely necessary device and is easy to use for the correct management of a radiance heating system. To regulate the temperature on 2-stage burners a 2-stage globothermostat is used which has technical features similar to those used on single-stage burners. The two-stage running of the burner can be regulated with this particular globothermostat, setting a temperature field in which the machine runs with one stage, in this way considerably energy-saving.

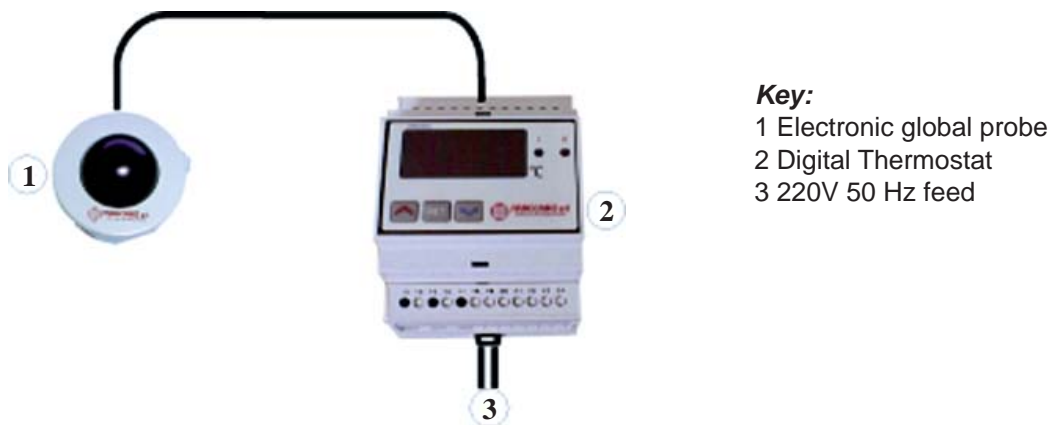
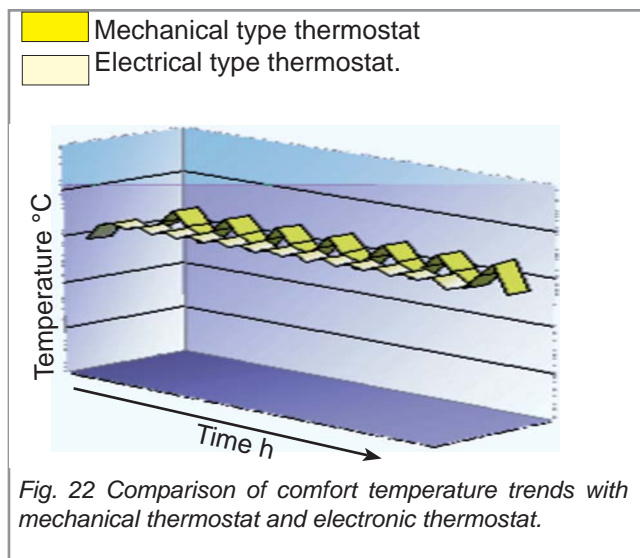
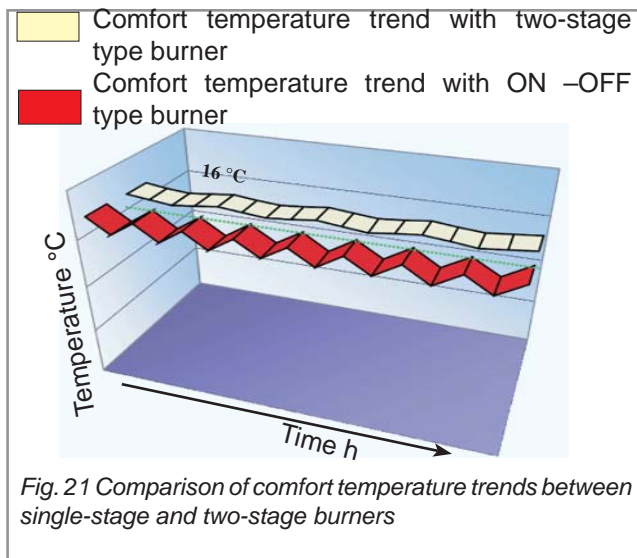


Fig. 20 Devices to control and regulate room comfort





## 5.1 DIGITAL NETWORK - DIGITAL COMPUTER COMFORT CONTROL

FRACCARO S.r.l. designed SCP200 GEN control to manage and control up to a maximum of 1200 SUNRAD emitters. This technology enables significantly to simplify the electrical system as well as the control of the whole system, as it is computer aided.

The network controlled by COMPUTER COMFORT CONTROL SCP200 GEN has the following functions:

- Data acquisition from probes inside and outside the building;
- Outputs to command relays;
- Control of ambient temperature
- Facility to program ignition and shut-down times of each generator according to customer's requirements;
- Real time complete control of the system state, with facility to modify programming at any time;
- Assignment to authorized personnel only of passwords enabling access to functions of SCP200 GEN;
- Control of SUNRAD emitters state;
- Subdivision of system into units, enabling zone-control;
- 2 outside probes to optimize the ignition times.
- Facility for management and control from PC;
- An Ethernet connection with Tibbo DS100 Serial server card is available as option.

### ELETTICAL CONNECTION TO THE SCP200 GEN NETWORK

SCP200 GEN network consists of the following units:

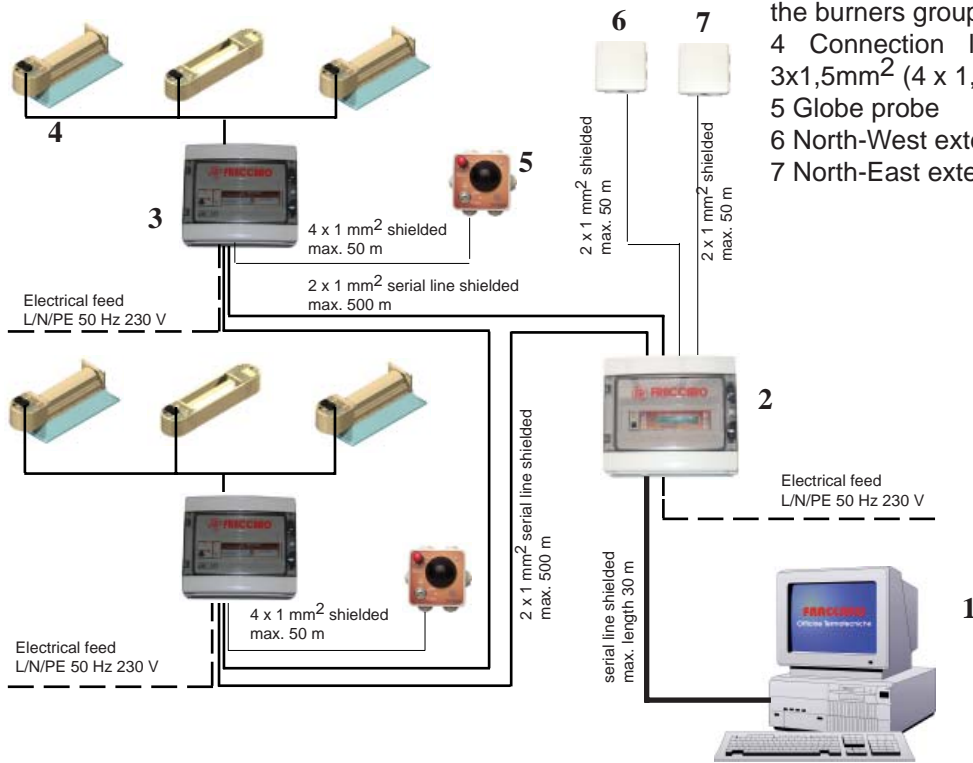
- 1) SCP200 GEN digital logic control unit for data control and management, up to 60 zones;
- 2) SCP200PER data transmission card (control up to 120 modules), complete with globe-thermostat with the function of data acquisition and transmission to SCP200 GEN digital logic control unit.

FRACCARO S.r.l. has also designed FRACCARO-STAT data management software in order to make the time scheduling easier, simplifying the reading of the whole system or single zone state reading and permitting the remote control of activities and parameters. SCP200 GEN network is the best one within the market for the optimization of the thermal power of SUNRAD emitters, according to the building outside and inside variations.



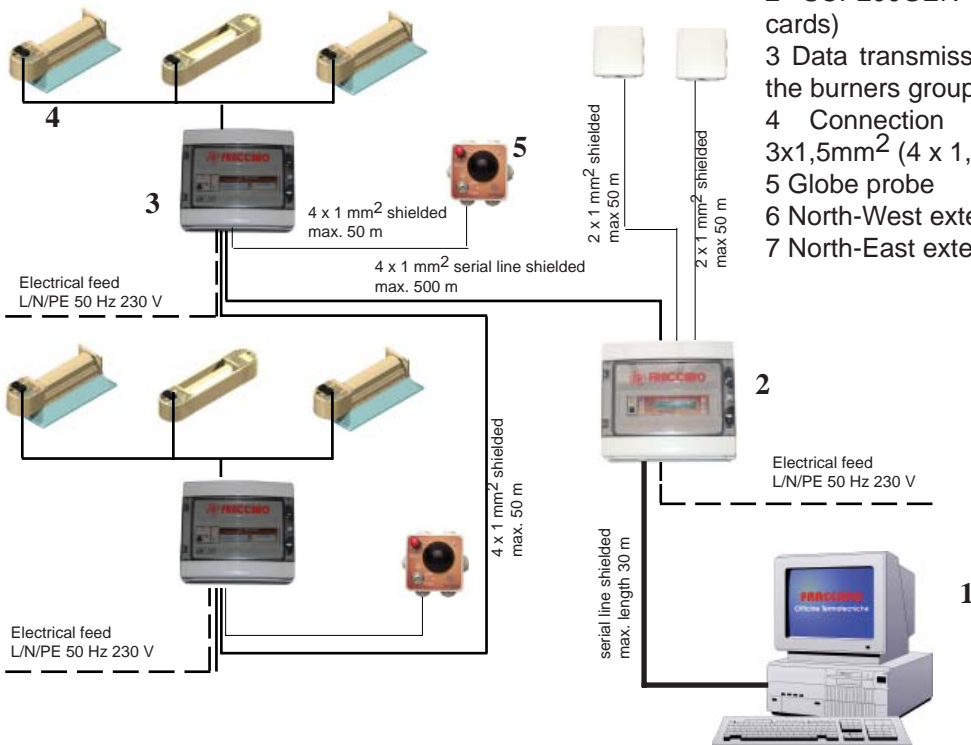
**Key:**

- 1 PC to manage and control heating system
- 2 SCP200GEN control panel (max. 60 cards)
- 3 Data transmission card for the control of the burners group.
- 4 Connection line between machines 3x1,5mm<sup>2</sup> (4 x 1,5 mm<sup>2</sup> if 2 stages)
- 5 Globe probe
- 6 North-West external probe
- 7 North-East external probe



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## 6.0 TECHNICAL CHARACTERISTICS OF EMITTERS

On/Off models	IEM10	IECH10	IEM20	IECH20	IEM30	IECH30	IEM35	IEM40	IEM60	IEM10 B	IEM20 B	IEM35 B	
CE certification number	51BM2072												
Max Power	[kW]	10	20	30	35	40	51BM2073	60	70	80	90	100	
Gas Consumption PCS	[m³st/h]	0,95	1,91	2,86	3,34	3,81	4,43	5,72	6,64	0,95	1,91	3,34	
	[m³st/h]	1,11	2,22	3,32	3,88	4,43	5,72	6,64	8,11	0,73	1,46	2,55	
	[Kg/h]	0,73	1,46	2,18	2,55	2,91	3,64	4,36	5,23	0,73	1,46	2,55	
	[Kg/h]	0,72	1,43	2,14	2,50	2,86	3,58	4,28	5,15	0,73	1,46	2,55	
<b>Dual stage Models</b>													
CE certification number	51BM2072												
Min/Max Power	[kW]	7/10	14/20	25/30	30/35	28/40	51BM2073	50/60	7/10	14/20	30/35	51BM2073	
Gas Consumption PCS	[m³st/h]	0,67-0,95	1,33-1,91	2,38-2,86	2,86-3,34	2,67-3,81	3,32-3,88	4,76-5,72	0,67-0,95	1,33-1,91	2,86-3,34	3,32-3,88	
	[m³st/h]	0,78-1,11	1,55-2,22	2,77-3,32	3,32-3,88	3,10-4,43	3,64-4,36	4,76-5,72	0,51-0,73	1,02-1,46	1,79-2,55	2,18-2,55	
	[Kg/h]	0,51-0,73	1,02-1,46	1,82-2,18	2,18-2,55	2,04-2,91	3,64-4,36	4,76-5,72	0,51-0,73	1,02-1,46	1,79-2,55	2,18-2,55	
	[Kg/h]	0,50-0,72	1,00-1,43	1,79-2,14	2,14-2,50	2,00-2,86	3,58-4,28	4,76-5,72	0,51-0,73	1,02-1,46	1,79-2,55	2,18-2,55	
Burner type	Atmospheric												
Gas connection	1/2"												
Electricity supply	[VAC 1N]	230V											
Power consumption	[Watt]	9											
Electrical power	[A]	0,04											
Weight	[Kg]	13	13,5	22,5	24	30,5	34	39	55	13	22,5	33	
Venturi tubes	[n°]	1											
Combustion air	[m³/h]	20	40	60	70	80	120	20	40	20	40	70	
Gas type	I3P; I12H3B/P; I2E(R)B; I3+; I3B/P; I2H; I12E13+; I12ELL3B/P; I12H3+; I12HS3B/P; I12L3B/P; I2E; I12E3B/P												

Electrical feed of Sunrad emitters: 230 V - 50 Hz

Gas inlet pressure: 20 mbar for G20; 28/30 or 50 mbar for G30

For IEM40 only: 30 mbar for G20.

Working Temperature: -20 ÷ 60 °C

Identification plate: As in the normative CEE/90/396

SUNRAD emitters can also be fed by combustible gasses G25 (methane-azote) and G31 (propane).



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## 7.0 UNI EN ISO 9001:2000 CERTIFICATES



## 8.0 EC CERTIFICATES



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# CERTIFICATO DI ESAME CE DI TIPO

## EC TYPE EXAMINATION CERTIFICATE

No. **51BM2073**

VISTO L'ESITO DELLE VERIFICHE CONDOTTE IN CONFORMITÀ ALL'ALLEGATO II, PUNTO 1,  
DEL DPR 15/11/96, N. 661, ATTUAZIONE DELLA DIRETTIVA 90/396/CEE,  
SI DICHIARA CHE I SEGUENTI PRODOTTI (MODELLO/TIPO):

*On the basis of our assessment carried out according to Annex II, section 1,  
of Legislative Decree of 1996/11/15, No. 661, national transposition of the Directive 90/396/EEC,  
we hereby certify that the following products (model/type):*

**Pannelli radianti a gas**

**Gas radiant panel heaters**

**Modelli vari**

**Various models**

*(ulteriori informazioni sono riportate in allegato)  
(for further information see annex)*

COSTRUITI DA:  
Manufactured by:

**OFFICINE TERMOTECNICHE FRACCARO-O.T.F. SRL**  
**VIA SILE 32 - Z.I.**  
**31033 CASTELFRANCO VENETO TV**

SODDISFANO LE DISPOSIZIONI DEL DECRETO SUDDETTO.  
*Meet the requirements of the aforementioned national legislation.*

QUESTO CERTIFICATO DI ESAME CE DI TIPO È RILASCIATO DA IMQ S.P.A. QUALE  
ORGANISMO NOTIFICATO PER LA DIRETTIVA 90/396/CEE,  
IL NUMERO IDENTIFICATIVO DELL'IMQ S.P.A. QUALE ORGANISMO NOTIFICATO È: **0051**

*This EC Type Examination Certificate is issued by IMQ S.p.A. as Notified Body for the Directive 90/396/EEC.  
Notified Body notified to European Commission under number: 0051*

2001-07-02

DATA

**IMQ S.p.A.**  
VIA QUINTILIANO 43 - 20138 MILANO

IL PRESENTE CERTIFICATO ANNULLA E SOSTITUISCE IL PRECEDENTE DEL  
*This Certificate cancels and replaces the previous one of*

*Il presente certificato è soggetto alle condizioni previste dall'IMQ nel "Regolamento relativo al rilascio di Certificati di esame di tipo e all'utilizzo della Marcatura CE  
su apparecchi a gas e dell'attestato per i relativi dispositivi di sicurezza, in base alla Direttiva 90/396/CEE".  
This Certificate is subjected to the provisions laid down in the "Rules concerning the issuing of EC Type Examination Certificates and the use of CE marking on gas fittings, following the provisions of the Directive 90/396/EEC."*



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