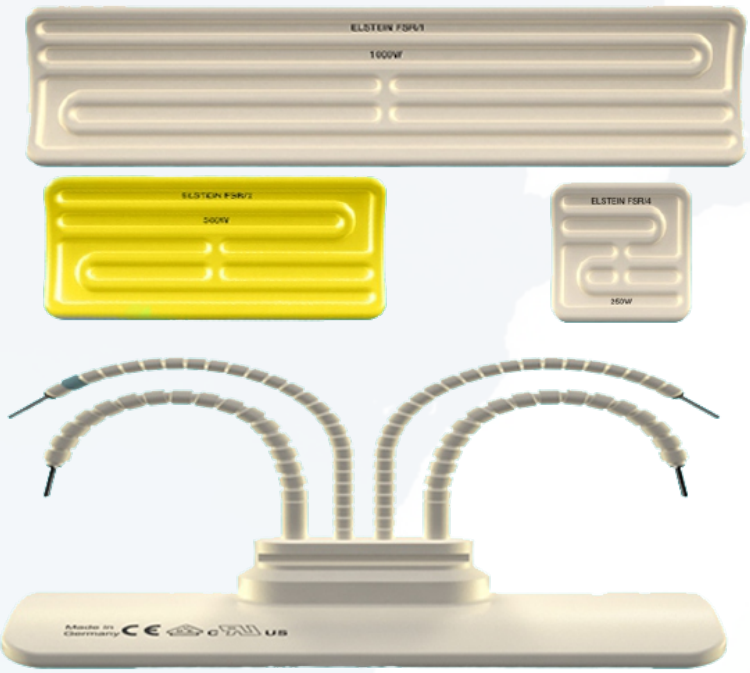
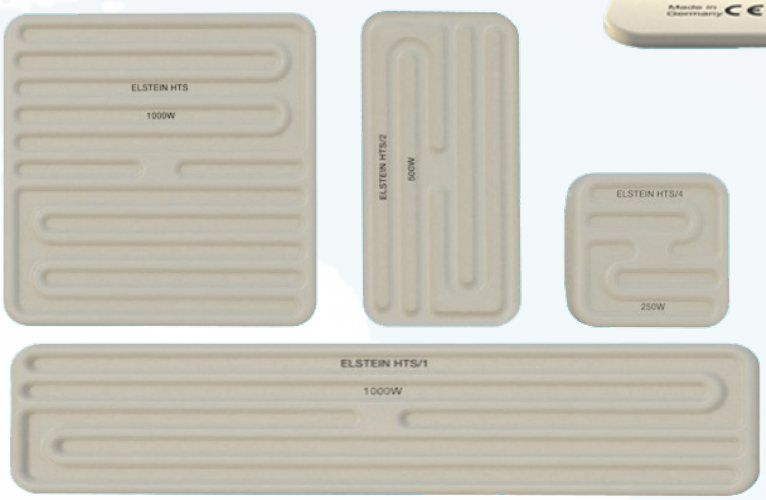
AURA HEAT ENERGY

HEAT UP SYSTEMS

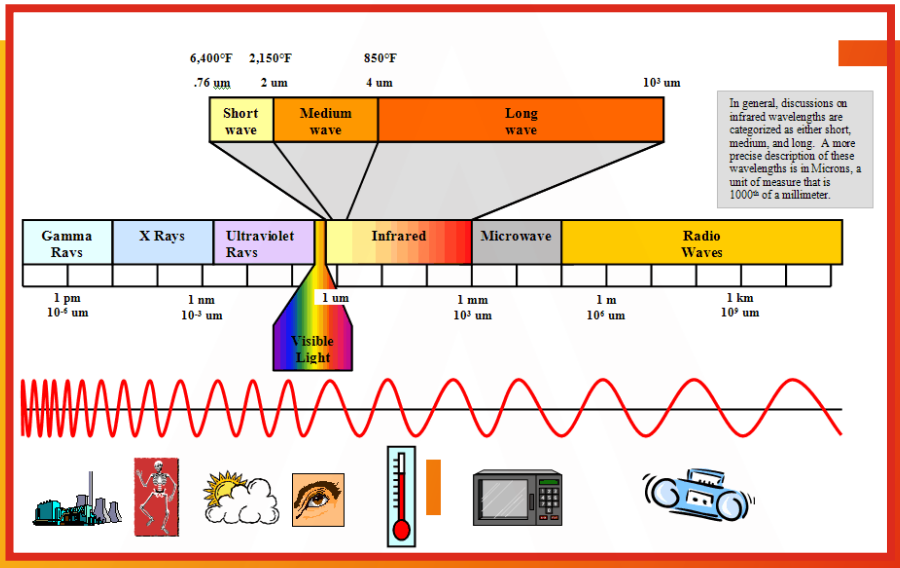
CERAMIC INFRARED HEATERS





BASIC OF INFRARED RADIATION

Infrared radiation is the term used to describe the emission and transmission (propagation) of electromagnetic waves within the spectral range above visible light from 0.7 µm up to around 80 µm. this emission and transmission of the electromagnetic waves is associated with the specific, directional transport of energy. the transmission of energy does not require a transport medium and is therefore also possible ina vacuum. the far or long infrared rays with above wavelength are mainly generated from heated ceramics that is the reason why far infrared ceramic heater is widely used as a heat source of heating and drying in industrial and commercial fields. the oxygen and nitrogen in air do not absorb far infrared rays, however, carbon dioxide (co2) and water vapour (h2o) absorb far infrared rays well.



WHAT ARE FAR INFRARED RADIATIONS ?

All materials more than absolute zero (-273ºC) radiate energy of the far infrared region, the higher the temperature is the higher the radiation. It is known that the amount of radiation in a certain temperature is affected by the material and by the surface condition. Ceramics are the kind of materials that radiate a lot of far infrared rays. Radiation of far infrared rays is low in metal, however metal reflects it well. Therefore metals with high reflectance are usually used as reflectors.

SPECTRAL RADIANT POWER

Infrared radiators are classified according to their wavelength maximum of the spectral radiant power into short, medium and long-wave radiators. In short- wave infrared radiators the maximum is less than 1.5 µm. Long-wave infrared radiators are those whose maximum lies above 3 µm. Between them are the medium-wave infrared heaters.

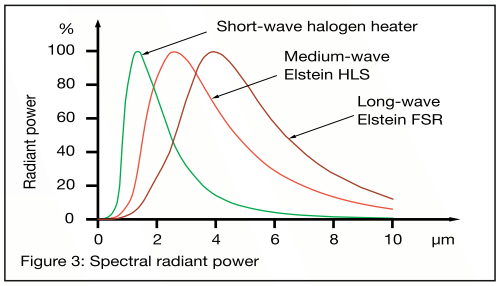


Figure 3: Spectral radiant power

SPATIAL RADIATION DISTRIBUTION

Elstein infrared radiators are produced with all kinds of different dimensions and geometries. They are available with round, long, square, rectangular and even with hemi-sphere shapes. The spatial distribution of the diffuse energy radiated in all directions depends on the outer shape. Figure shows the radiation distributions for two spacings of Elstein HTS/1, HTS/2 and HTS/4. Similar distributions also result for the other models. The intensity is determined by the respective surface temperature. At this point, please note that the curved shape of the FSR does not have any focussing effect with respect to the radiation.

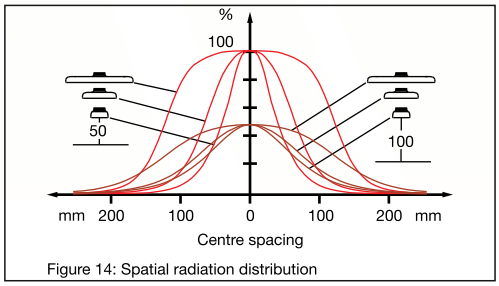


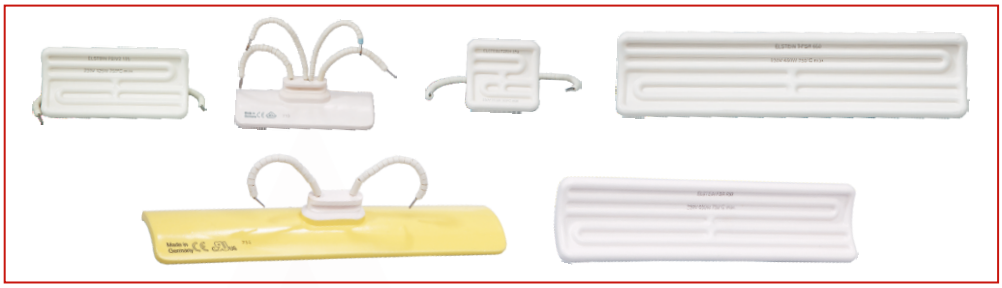
Figure 14: Spatial radiation distribution

PRODUCTS AT A GLANCE

FSR series — Proved Quality

a) 245mm x 60mm - 250 W to 1000 W
b) 122mm x 60mm - 125 W to 500 W
c) 60mm x 60mm - 60 W to 250 W

typ. up to 720 °C
max. 64.0 kW/m²
2-10 µm



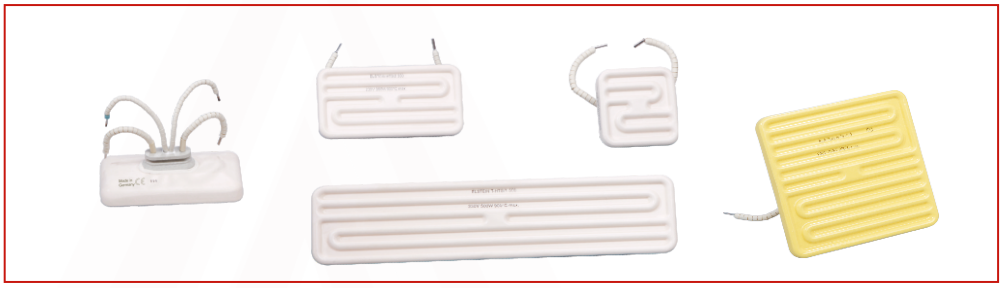
Elstein FSR Series

HTS series — Energy Saving

a) 122mm x 122 mm - 250 W to 1000 W
b) 245mm x 60 mm - 250 W to 1000 W
c) 122mm x 60 mm - 125 W to 500 W
d) 60mm x 60 mm - 60 W to 250 W

typ. up to 860°C
max. 64.0 kW/m²
2-10 µm

ENERGY SAVING SERIES



Elstein HTS Series

FSF series

a) 122mm x 122 mm - 250 W to 1000 W
b) 245mm x 60 mm - 250 W to 1000 W
c) 122mm x 60 mm - 125 W to 500 W
d) 60mm x 60 mm - 60 W to 250 W

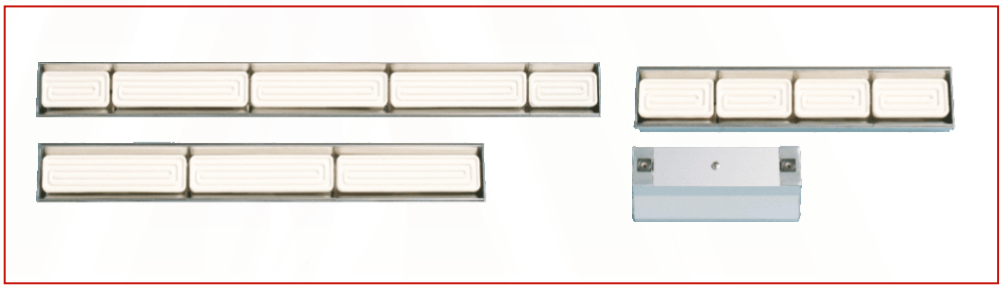
max. 64,0 kW/m²
typ. up to 720°C

Elstein FSF Series

EBF series — Energy Saving

a) 100mm x 250 to
b) 100mm x 1250 mm
c) Other lengths on request

typ. up to 860 °C
max. 48.0 kW/m²
2-10 µm



Elstein EBF equipped with heaters on the HTS Series

BSI series — IR system, even geometry

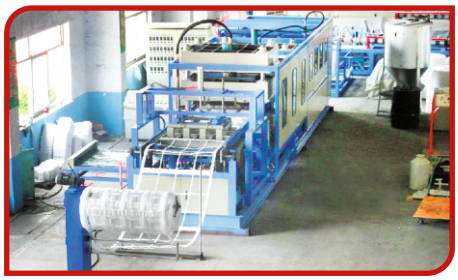
125mm x 250mm to
1000mm x 1500 mm
Other sizes on request

typ. up to 860 °C
max. 64.0 kW/m²
2-10 µm

Elstein BSI Construction Panel 1250*1875 mm Equipped with HTS

APPLICATIONS OF CERAMIC INFRARED HEATERS

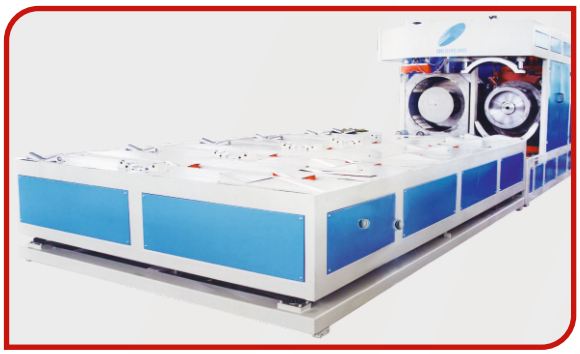
THERMO FORMING MACHINE



VACUUM FORMING MACHINES

PIPE SOCKETING BELLING WITH MACHINES

HOT STAMPING MACHINE



PIPE SOCKETING BELLING WITH MACHINES

Heating plastic foils and sheets in thermoforming machines

- Production of shrink foils and films
- Gelling PVC pasty coats on fabrics
- Heating GRP and CRP parts during production
- Thermofixation of nylon and perlon threads
- Activating glues and hot seal coats
- Drying plastic emulsions
- Heating laminated materials before punching
- Drying raw and printed papers, cardboards and wallpapers
- Drying skins, hides and paint sprayed leather
- Quick-drying gummed papers
- Drying and baking enamelled sheet metal parts
- Baking on powder coatings
- Drying glazes on ceramic tiles
- Tempering glass
- Drying washed glass
- Soldering printed circuit boards
- Pre-heating weld seams in pipe construction
- Baking on sound insulating mats
- Heating climatic chambers
- Drying washed, dyed and dressed fabric
- Baking on fluidised bed coatings
- Drying glued wood or furniture pieces
- Heating the paper mash before it is squeezed
- Pre-heating plastic pipes for joining

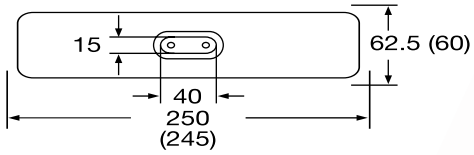
This list could be continued and infinitum. This is be cause almost all application, production, handling as well as refining processes involve drying or heating tasks, and these can be solved outstandingly well using Elstein infrared radiators.

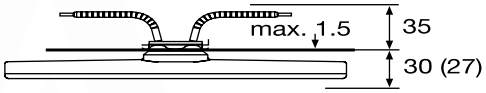
CERAMIC INFRARED HEATERS - FSR

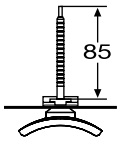
Elstein FSR series

Elstein Infrared Heaters are designed to produce maximum output in form of heat energy. They are constructed by a firmly burnt-in heating coil. The heater incorporates highly heat proof resistance wire that provides safety against any damage. We supply Custom Wattage Infrared Ceramic Heaters as per the requirement of our clients. Longer service life is achieved since the resistance of the heaters is made to remain constant over the whole temperature range. The glaze used in this heater has excellent radiation properties therefore the radiation efficiency is also very high. This heater is available with Color Changing Feature as Yellow Ceramic IR Heater (CC FSR).

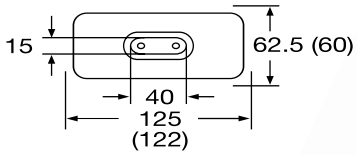
FSR

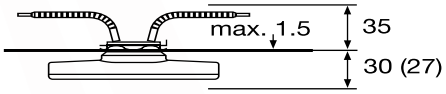


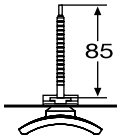




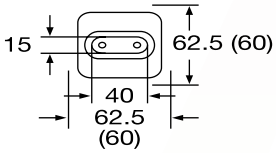
FSR/2

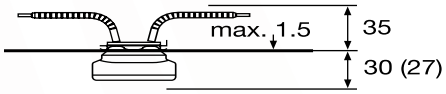


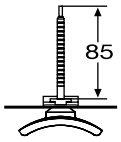




FSR/4







Type, weight, wattage							
	FSR	220 g	250	400	650	1000	W
	FSR/2	125 g	125	200	325	500	W
	FSR/4	75 g	60	100	200	250	W
Installable surface rating			16.0	25.6	41.6	64.0	kW/m²
Typical operating temperature			to 400	to 500	to 620	to 720	°C
Maximum permissible temperature			750	750	750	750	°C
Wavelength range			2 - 10				µm

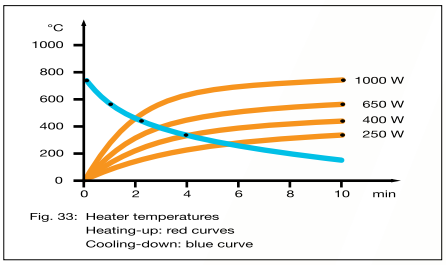


Fig. 33: Heater temperatures
Heating-up: red curves
Cooling-down: blue curve

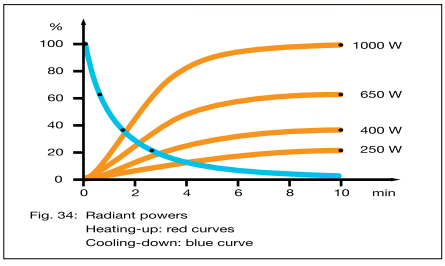


Fig. 34: Radiant powers
Heating-up: red curves
Cooling-down: blue curve

Standard design

Operating voltage 230 V
Ceramic full-pour casting
Leads 85 mm
Elstein standard socket
Mounting set

Thermocouple heaters

Designation T-FSR, T-FSR/2, T-FSR/4
Integrated thermocouple
Type K (NiCr-Ni)
TC leads 100 mm

Variants

Special wattages
Special voltages
Extended leads
Leads with ring terminals
Coloured glazes

The power can be controlled using thermocouple heaters together with TRD 1 temperature controllers, TSE thyristor switching units and other accessories.

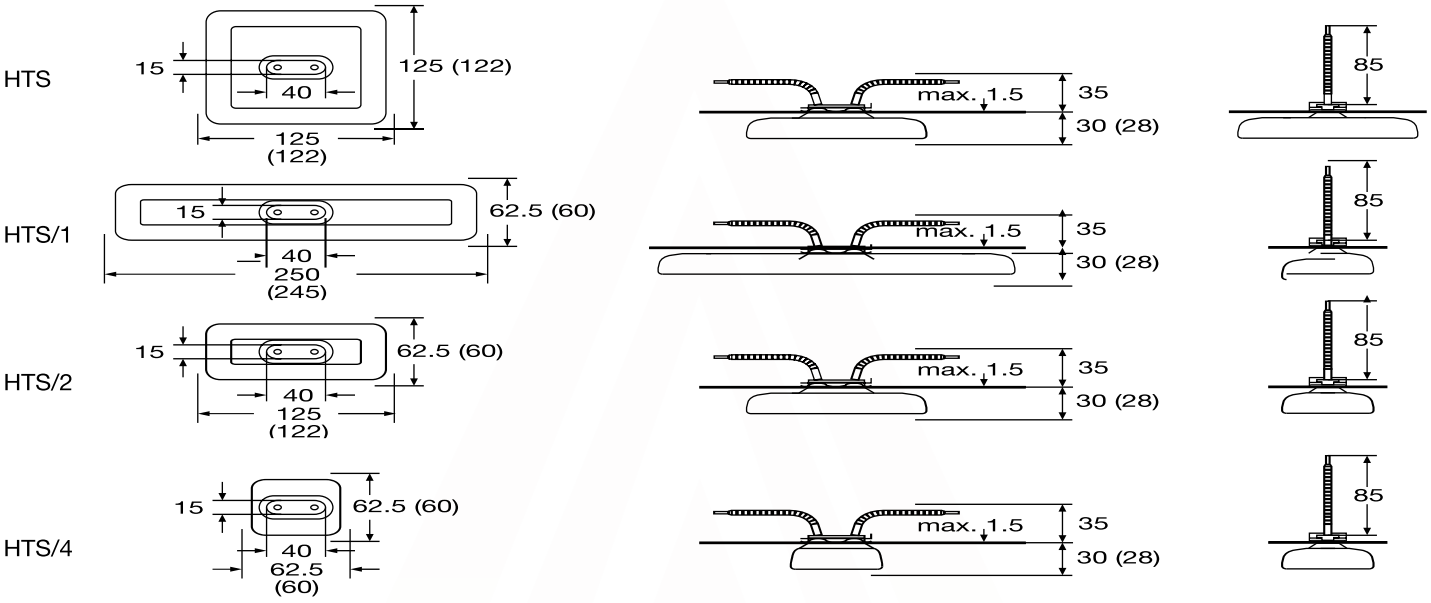
IR radiation areas can be assembled using REO reflectors, REF construction sets, EBF and EBI construction elements as well as MBO mounting sheets.

The national safety regulations must be complied with for the respective application, for example, the IEC or EN standard 60519-1, Safety in electrical heating installations.

Our instructions for mounting, operation and safety must be observed.

CERAMIC INFRARED HEATERS - HTS

Elstein HTS High Temperature Heaters are ceramic infrared panel heaters, which can be used for operating temperatures up to 900 °C and surface ratings up to 64 kW/ m².HTS series heaters are produced using a hollow-casting ceramic process and are filled with thermal insulation material. This improves the radiant power output to the material to be heated.Elstein HTS(Energy Saving) Series Furthermore, there is a significant reduction in heat dissipated in the wiring space, so that additional insulation of the heating area is usually not required. Compared with IR heaters, which are produced by using full-poured casting processes, HTS heaters have a considerably reduced heating-up time and, depending on the type of application, enable energy savings of up to 25 %. Elstein HTS (Energy Saving) SeriesElstein HTS high temperature heaters are available in four designs and cover the power range from 60 W to 1000 W.



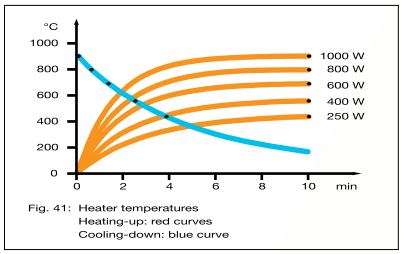


Fig. 41: Heater temperatures
Heating-up: red curves
Cooling-down: blue curve

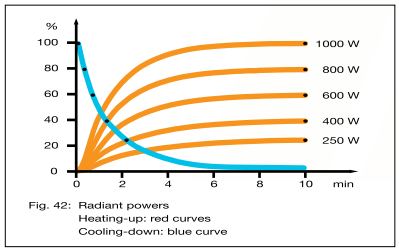


Fig. 42: Radiant powers
Heating-up: red curves
Cooling-down: blue curve

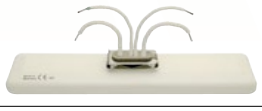
Type, weight, wattage	HTS/1, HTS	220 g	250	400	600	800	1000	W
	HTS/2	125 g	125	200	300	400	500	W
	HTS/4	75 g	60	100	150	200	250	W
Installable surface rating			16.0	25.6	38.4	51.2	64.0	kW/m²
Typical operating temperature			to 450	to 570	to 700	to 810	to 860	°C
Maximum permissible temperature			900	900	900	900	900	°C
Wavelength range			2 - 10					µm

Standard design

Operating voltage 230 V
Ceramic hollow casting
Integrated thermal insulation
Leads 85 mm
Elstein standard socket
Mounting set

Thermocouple heaters

Designation T-HTS, T-HTS/1, T-HTS/2, T-HTS/4
Integrated thermocouple
Type K (NiCr-Ni)
TC leads 100 mm



Variants

Special wattages
Special voltages
Extended leads
Leads with ring terminals
Coloured glazes

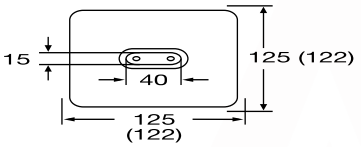
ENERGY SAVING CALCULATION

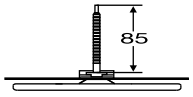
An example of a heating panel that illustrates this point is the 1.0 m x 1.5 m Elstein BSH. The heating panel contains a total of 96 ceramic heaters of conventional build (without insulation). The 96 ceramic heaters provide a total output of 38.4 kW (individual output = 400 W) and the heating panel is operated 8 hours a day and 280 days a year. The price of industrial energy is Rs.7.00 per kWh on average in India. The yearly cost of energy thus amounts by Ordinary heater is Rs. 602112 per annual If the heating elements in this heating panel are exchanged for modern ceramic heaters such as the Elstein HTS, savings of at least Rs.120422.4 (Saving amount per year) HTS Heater gives up Energy Saving Trust up to 20% Power Consuming factor for the year of conversion.This savings factor should be taken into consideration when pursuing efforts to lower operating costs because return on investment (ROI) is achieved in the very first year

CERAMIC INFRARED HEATERS - FSF

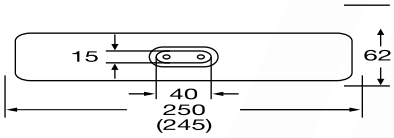
Elstein FSF panel radiators are ceramic infrared radiators with a low overall height. They are produced using a full-pour casting ceramic process and are designed Ceramic Infrared Panel Radiators FSF Series for operating temperatures up to 720 °C and surface ratings up to 64 kW/m². Compared to other Elstein panel radiators, which have the standard socket, the overall height of the FSF radiators, measured from the radiation surface up to the mounting plate, has been reduced by approximately 45 %. FSF series radiators can be used universally Elstein FSF seriesThe low overall height of the radiators enables space-saving installation, for example, which may be required to retrofit machines. Esltein FSF radiators are available in four designs and cover the power range from 60 W to 1000W. They have the customary market dimensions and can there-fore be replaced with radiators with corresponding properties if the requirements change.

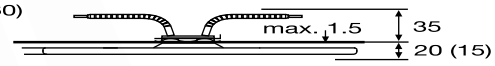
FSF

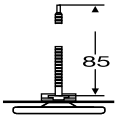




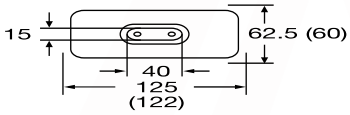
FSF/1

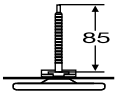




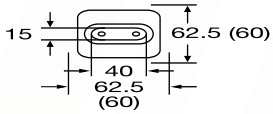


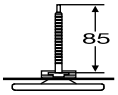
FSF/2





FSF/4





Mounting dimensions and radiator dimensions ( ) in mm

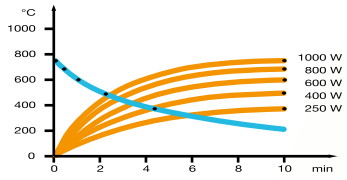


Fig. 3: Radiator temperatures
Heating-up: red curves
Cooling-down: blue curve

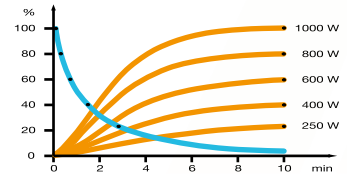


Fig. 4: Radiant powers
Heating-up: red curves
Cooling-down: blue curve

Type, weight, wattage	FSF/1, FSF	220 g	250	400	600	800	1000	W
	FSF/2	125 g	125	200	300	400	500	W
	FSF/4	75 g	60	100	150	200	250	W
Surface rating			16.0	25.6	38.4	51.2	64.0	kW/m²
Typical operating temperature			400	500	590	670	720	°C
Maximum permissible temperature			750	750	750	750	750	°C
Wavelength range			2 - 10					µm

Standard design

Operating voltage 230 V
Ceramic full-pour casting
White glaze
Leads 85 mm
Elstein standard socket
Mounting set

Thermocouple radiators

Designation T-FSF, T-FSF/1, T-FSF/2, T-FSF/4
Integrated thermocouple
Type K (NiCr-Ni)
TC leads 100 mm

Variants

Special wattages
Special voltages
Extended leads
Leads with ring terminals

CONSIDERATION

The power can be controlled using thermocouple radiators together with TRD 1 temperature controllers, TSE thyristor switching units and other accessories.

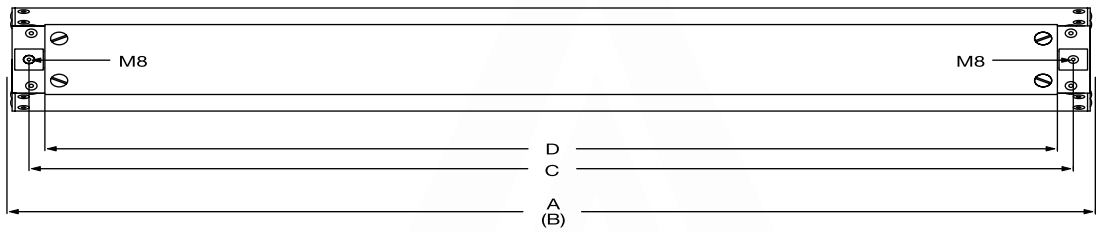
IR radiation areas can be assembled using MBO mounting sheets.

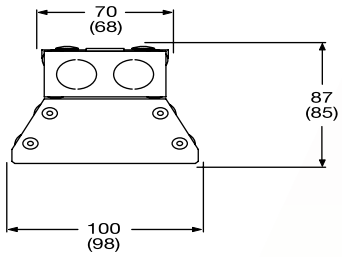
The national safety regulations must be complied with for the respective application, for example, the IEC or EN standard 60519-1, Safety in electrical heating installations.

Our instructions for mounting, operation and safety must be observed.

INFRARED RADIATION SYSTEMS - EBF SERIES

Elstein EBF construction elements are assembled in our factory. They can be equipped with Elstein ceramic panel heaters FSR, HSR/1, HTS/1, SHTS/1 and FSR/2, HSR/2, HTS/2, SHTS/2, whereby it is also possible to combine different heater designs and wattages of the same types of heaters.The ceramic infrared heaters mounted in stainless steel reflectors are inserted in the lower part of an extruded, anodised aluminium section with an H-shaped cross-section. Aluminium capping sections close the wiring space in the upper part of the section and die cast end pieces close the end faces. Elstein EBF Equipped with Heaters of the HTS Series The user only has to do the wiring, screw-in the EBF elements in a steel section frame to be made on site and connect up with the electricity mains.Elstein EBF construction elements are available in four lengths and can be fitted together to form flat or curved heating panels in any installed position.





	A	B	C	D
EBI/25	260	257	233	210
EBI/37,5	386	383	359	336
EBI/50	513	508	484	461
EBI/62,5	641	634	610	587
EBI/75	767	759	735	712

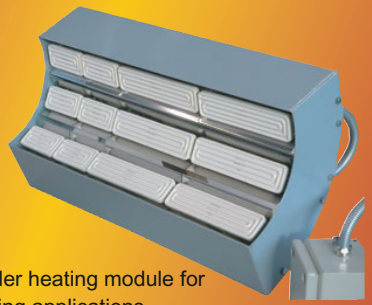
	A	B	C	D
EBI/87,5	894	885	861	838
EBI/100	1020	1010	986	963
EBI/112,5	1148	1136	1112	1089
EBI/125	1275	1261	1237	1214
Other lengths available on request (from 125 mm to 2500 mm and longer)				

When exchanging EBF against EBI varying dimensions of housing and installation must be considered.

Mounting dimensions and EBI dimensions ( ) in mm

- Standard scope delivery (Variant and other length are available on request).
- Ceramic Infrared Heater, Fitted, Selectable heater types:
- FSM, FSR, HSR/1, HTS/1, SHTS/1, FSM/2, HSR/2, HTS/2, SHTS/2
- The maximum heater power level available is 1200w. Mixed heater wattages and dimensions can be fitted.
- REO reflectors for the radiator dimensions 245mm*60mm and 122mm*60mm.
- The reflectors fitted with ceramic infrared radiators are also available separately under the type designations REF/250 and REF/125.

FSR Heaters (inside heat therapy appliance for warming Human Body with safety mesh)



HTS Heaters Inside Roller heating module for semi-circular heating applications.

Length in mm

Elstein BSI construction panels are infrared radiation areas, which can be equipped with the ceramic IR panel radiators HTS or HSR. The ceramic infrared panel radiators are fixed to the MBO mounting sheets and surrounded with a housing of frame and capping sections. All housing parts consist of stainless steel so that radiators with high power can be used, too. The BSI construction panels are factory assembled so that the user only has to do the wiring, insert the BSI panel in a steel section frame to be made on site and connect the panel with the electricity mains. Elstein BSI construction panels can be fitted with HTS Elstein BSI construction panel 1250*1875mm equipped with HTS Equipped with radiators up to 800 W or rather with HSR radiators u to 1000 W and are suited for building infrared heating areas in any dimensions

Inner dim. (Outer dim.) [No. of rad.]	250 (261) [2]	375 (386) [3]	500 (511) [4]	625 (636) [5]	750 (761) [6]	875 (886) [7]	1000 (1011) [8]	1125 (1136) [9]	1250 (1261) [10]	1375 (1386) [11]	1500 (1511) [12]		Heater wattage
125 (136) [1]	0.50 to 2.00	0.75 to 3.00	1.00 to 4.00	1.25 to 5.00	1.50 to 6.00	1.75 to 7.00	2.00 to 8.00	2.25 to 9.00	2.5 to 10.00	2.75 to 11.00	3.00 to 12.00	kW to kW	250 W to 1000 W
250 (261) [2]	1.00 to 4.00	1.50 to 6.00	2.00 to 8.00	2.50 to 10.00	3.00 to 12.00	3.50 to 14.00	4.00 to 16.00	4.50 to 18.00	5.00 to 20.00	5.50 to 22.00	6.00 to 24.00	kW to kW	250 W to 1000 W
375 (386) [3]	1.50 to 6.00	2.25 to 9.00	3.00 to 12.00	3.75 to 15.00	4.50 to 18.00	5.25 to 21.00	6.00 to 24.00	6.75 to 27.00	7.50 to 30.00	8.25 to 33.00	9.00 to 36.00	kW to kW	250 W to 1000 W
500 (511) [4]	2.00 to 8.00	3.00 to 12.00	4.00 to 16.00	5.00 to 20.00	6.00 to 24.00	7.00 to 28.00	8.00 to 32.00	9.00 to 36.00	10.00 to 40.00	11.00 to 44.00	12.00 to 48.00	kW to kW	250 W to 1000 W
625 (636) [5]	2.50 to 10.00	3.75 to 15.00	5.00 to 20.00	6.25 to 25.00	7.50 to 30.00	8.75 to 35.00	10.00 to 40.00	11.25 to 45.00	12.50 to 50.00	13.75 to 55.00	15.00 to 60.00	kW to kW	250 W to 1000 W
750 (761) [6]	3.00 to 12.00	4.50 to 18.00	6.00 to 24.00	7.50 to 30.00	9.00 to 36.00	10.50 to 42.00	12.00 to 48.00	13.50 to 54.00	15.00 to 60.00	16.50 to 66.00	18.00 to 72.00	kW to kW	250 W to 1000 W
875 (886) [7]	3.50 to 14.00	5.25 to 21.00	7.00 to 28.00	8.75 to 35.00	10.50 to 42.00	12.25 to 49.00	14.00 to 56.00	15.75 to 63.00	17.50 to 70.00	19.25 to 77.00	21.00 to 84.00	kW to kW	250 W to 1000 W
1000 (1011) [8]	4.00 to 16.00	6.00 to 24.00	8.00 to 32.00	10.00 to 40.00	12.00 to 48.00	14.00 to 56.00	16.00 to 64.00	18.00 to 72.00	20.00 to 80.00	22.00 to 88.00	24.00 to 96.00	kW to kW	250 W to 1000 W

Width in mm

Maximum surface rating 64.0 kW/m² Weights approx. 50 kgs/m2 Other dimensions and surface ratings available on request
The outer dimensions indicated in the table do not include the mounting fishplates.
Overview of the standard dimensions, outer dimension ( ), number of heaters [] and the connected load in kW.

- Standard scope of delivery(Variants available on request).
- Ceramic Infrared radiators HTS and T-HTS or HSR and T-HSR, fitted Radiators can be chosen from the radiator power ratings 250w, 400w, 600w and 800w.
- The HSR heaters can be fitted also up to 1000w.
- Frame sections with mounting fishplates and capping sections both made from only stainless steel.
- Wiring material(Nickel wire, Thermo line)

OTHER CERAMIC INFRARED HEATER PRODUCTS

IRS SERIES

rod radiator 245 x 16 mm
122 x 16 mm type. up to 650 °c
max. 72.0 kw/m²
2-10 µm

MAXLIFE FSM-SERIES

maximum service life 245 x 60 mm
122 x 60 mm
60 x 60 mm type. up to 720 °c
max. 64.0 kw/m²
2-10 µm

IOT-75/90 SERIES

easy connectionm(e27)ø 75 mm
ø 90 mmtyp. up to 490 °c
max. 25.0 kw/m²
3-10 µm

REF SERIES

infrared radiator with
reflector250 x 95 mm
125 x 95 mm type. up to 860 °c
max. 48.0 kw/m²
2-10 µm

SHTS SERIES

max. power, panel radiator
122 x 122 mm / 245 x 60 mm
122 x 60 mm
60 x 60 mm type. up to 860 °c
max. 76.8 kw/m²
2-10 µm

RFS SERIES

RFS series
Ø 125 mm
Ø 100 mmmax. 46.2 kW/m²
typ. up to 610 °C

HSR SERIES

Short heat-up and cool-down time
122 x 122 mm / 245 x 60 mm
122 x 60 mm type . up to 860 °C
max. 64.0 kW/m²
2-10 µm

SFH-SERIES

Flat, space saving installation
123 x 123 mm / 246 x 61 mm
123 x 61 mm
61 x 61 mm type. up to 800 °C
max. 64.0 kW/m²
2-10 µm

MSH/20

Smallest ceramic radiator
20 x 10 mm
Width: 10 mm type. up to 900 °C
max. 100 kW/m²
2-10 µm

HLS SERIES

Max. power, rod radiator
245 x 32 mm 122 x 32 mm type.
up to 1000 °C
max. 87.0 kW/m²
2-10 µm

OTHER CERAMIC INFRARED HEATER PRODUCTS

HFS SERIES

a) 122 x 122 mm
b) 245 x 60 mm
c) 122 x 60 mm
d) 60 x 60 mm max. 38.4 kW/m²
type. up to 630 °C

LCR

245 x 95 mm
max. 60.0 kW/m²
type. up to 710 °C

HLF SERIES

122 x 122 mm
max. 41.6 kW/m²
type. up to 630 °C

IRS/K SERIES

from 125 mm
to 300 mm 30.0 - 75.0 kW/m²
type. up to 700 °C

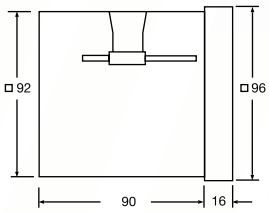
SHTS SERIES

FSLa) 37 x 326 mm
b) 37 x 163 mm
max. 45 kW/m²
type. up to 550 °C

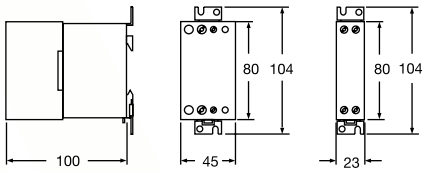
BSH SERIES

from 125x250mm to 1000x1500mm
and larger max. with HTS to 600W
with HSR to 600W
38.4 kW/m²
type. up to 700°C

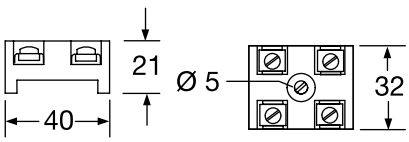
ELSTEIN TRD 1 TEMPERATURE CONTROLLER



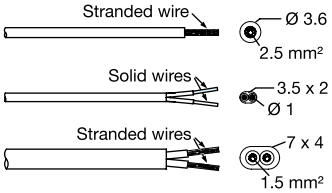
ELSTEIN TSE 1 THYRISTOR SWITCHING UNITS



ELSTEIN AK TERMINAL CLAMP



ELSTEIN WIRE STANDARDS



AURA HEAT ENERGY

S1, Plot No. 6, Durga Street, Sri Sakthi Nagar, Arumbakkam, Chennai - 600 106.
Tel: 044- 2363 1771 | Mobile: 96006 22771
Email: sales@auraheatenergy.com | www.auraheatenergy.com