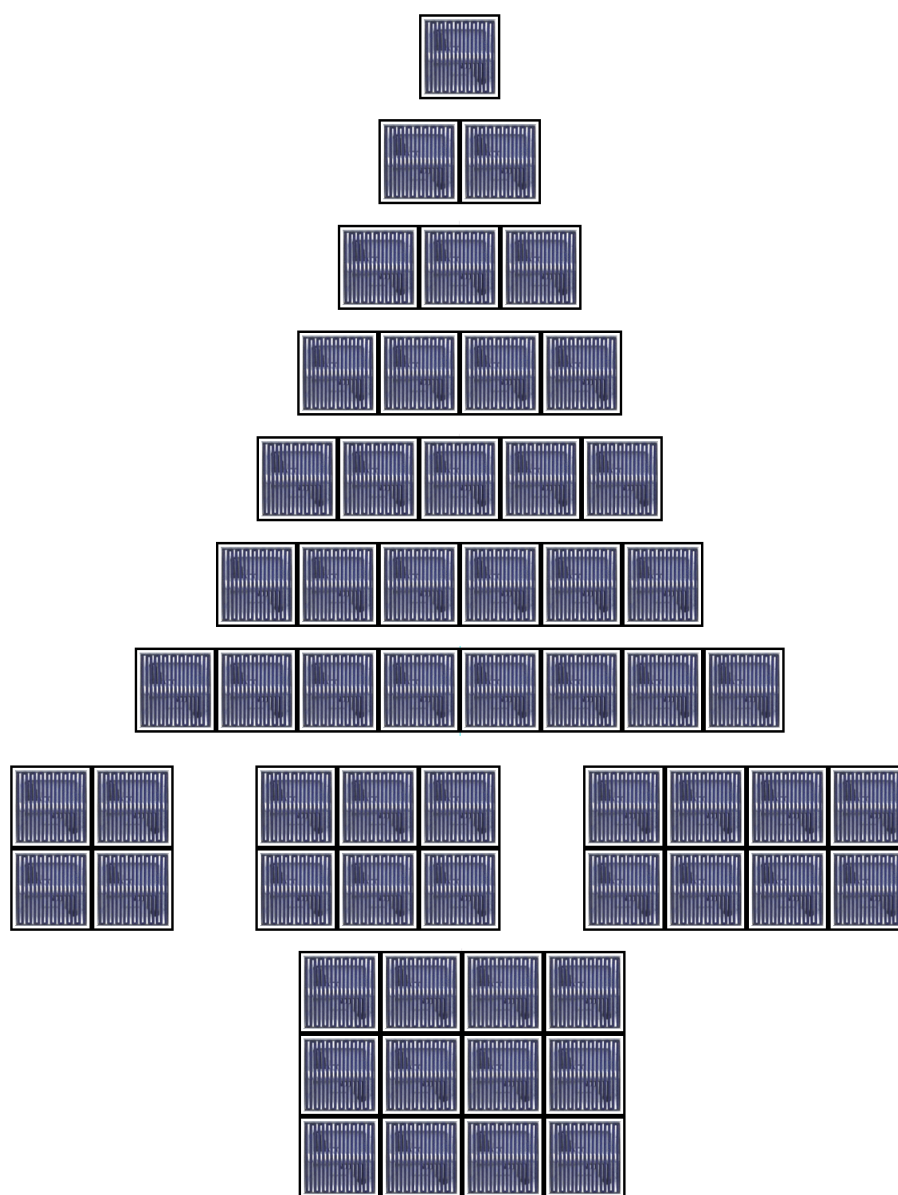


Instantaneous Heating INFRARED PANEL-HEATER PHX series

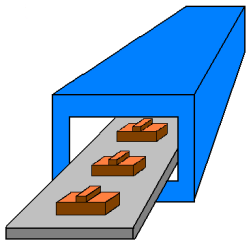


Heat-tech

Version 3

Applications of Ir Panel Heater

No.1 Small dry oven

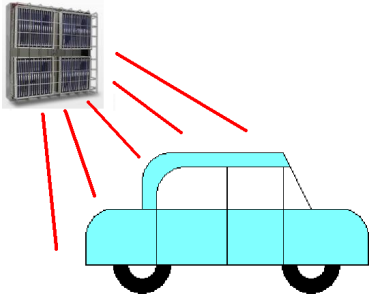


《 Problem Point 》
Starting of a drier took time too much.

《 ⇒Kaizen Point 》
Heated by the Ir Panel Heater.
Since rapid heating, increased uptime.
Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.2 Touch-up dryer

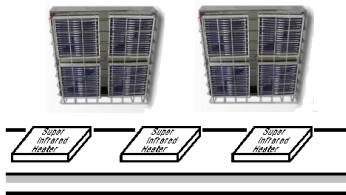


《 Problem Point 》
Starting of a drier took time too much.

《 ⇒Kaizen Point 》
Dried by the Ir Panel Heater.
Since the dryer is heated quickly, no longer waiting time.
Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.3 Dryness of a silk print

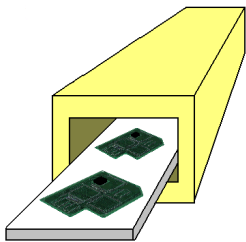


《 Problem Point 》
Starting of a drier took time too much.

《 ⇒Kaizen Point 》
Dried by the Ir Panel Heater.
Since the dryer is heated quickly, no longer waiting time.
Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.4 Reflow of printed circuit boards

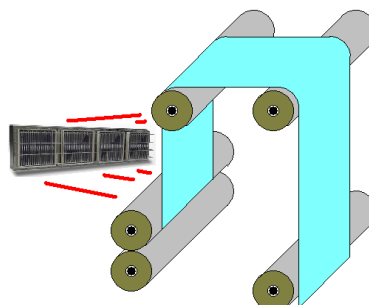


《 Problem Point 》
We have no idea about Reflow of printed circuit boards.

《 ⇒Kaizen Point 》
Reflow by the Ir Panel Heater.
Since rapid heating, increased uptime.
Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.5 Preheat of film

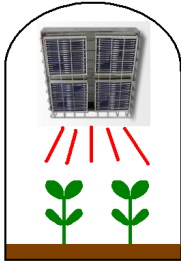


《 Problem Point 》
We have no idea about preheat of film.

《 ⇒Kaizen Point 》
Preheat by the Ir Panel Heater.
Since rapid heating, increased uptime.
Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.6 Growth and the light source for promoting germination of a plant factory



《 Problem Point 》

We have no idea about cost cut of electric.

《 ⇒Kaizen Point 》

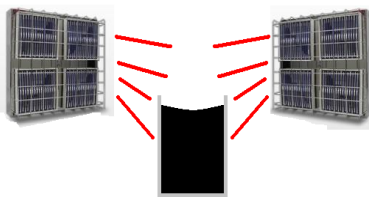
Grown-up ray was illuminated by the Ir Panel Heater.

The far-infrared radiation was illuminated at the moment, so power time was finished by a short time and it was energy conservation.

Management in upbringing time became correct.

Applications of Ir Panel Heater

No.7 Curing of the epoxy resin



《 Problem Point 》

We have no idea about curing of the epoxy resin.

《 ⇒Kaizen Point 》

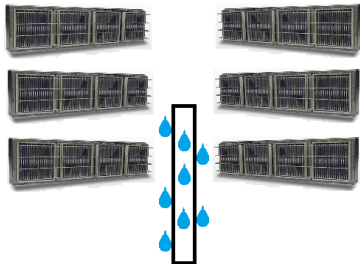
Curing by the Ir Panel Heater.

Since rapid curing, increased uptime.

Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.8 Heating unit for drying booth



《 Problem Point 》

We have no idea about heating unit for drying booth.

《 ⇒Kaizen Point 》

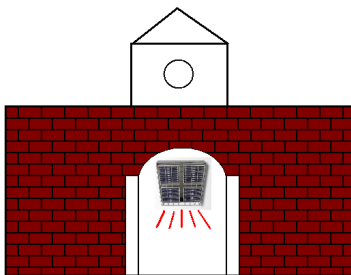
Drying by the Ir Panel Heater.

Since rapid heat up on drying booth, increased uptime.

Now able to respond flexibly to unexpected interrupt work.

Applications of Ir Panel Heater

No.9 Heating of the entrance hall



《 Problem Point 》

We have no idea about rapid heating of the entrance hall.

《 ⇒Kaizen Point 》

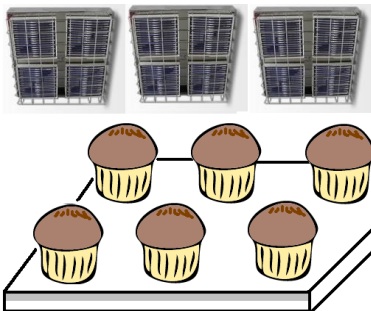
Heating by the Ir Panel Heater.

Since rapid heat up on the entrance hall,

Sudden visitors could be glad.

Applications of Ir Panel Heater

No.10 Keeping warm storage of foods



《 Problem Point 》

Since going up of the temperature of the storage warehouse is slow, foods get cold.

《 ⇒Kaizen Point 》

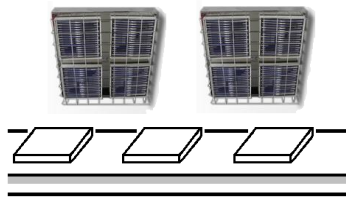
Warming by the Ir Panel Heater.

Keeping warm storage does temperature up by a short time, so the foods cool and have run out.

It was possible to keep gusto of the ingredients.

Applications of Ir Panel Heater

No.11 Anneal of glass



《 Problem Point 》

We have no idea about good annealing of the glass.

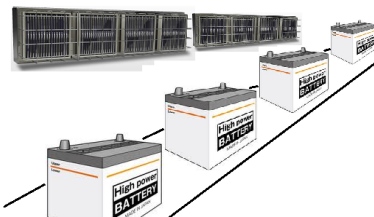
《 ⇒Kaizen Point 》

Heating by the Ir Panel Heater.

Glass is able to be warmed on the broad wavelength.

Applications of Ir Panel Heater

No.11 Annealing of Wind glass



《 Problem Point 》

We have no idea about good annealing of the glass.

《 ⇒Kaizen Point 》

Warming by the Ir Panel Heater.

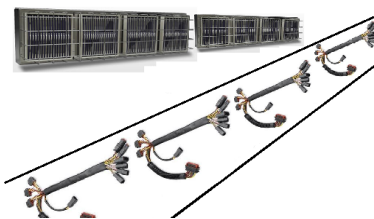
Glass is able to be warmed on the broad wavelength.

Since the temperature of the heater went up for a short time, operation time increased.

It was possible to keep gusto of the ingredients.

Applications of Ir Panel Heater

No.13 Heating and keeping warm of wire harness



《 Problem Point 》

The wire did not fit, it was troubled by the temperature near the freezing point of winter.

《 ⇒Kaizen Point 》

Warming by the Ir Panel Heater.

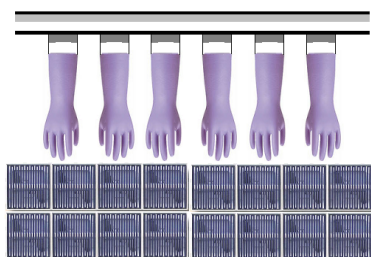
of temperature up at the moment.

The wire got used in the engine room

and good wiring of the settlement was completed.

Applications of Ir Panel Heater

No. 14 Heating and drying of rubber gloves.



《 Problem Point 》

Rubber was not drying, and it was troubled by the temperature close to the sub-zero winter.

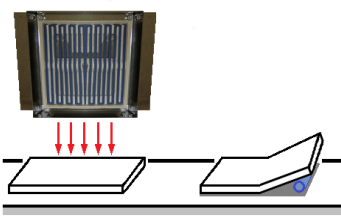
《 ⇒Kaizen Point 》

It was heated by the far-infrared heater which temperature rise of the high speed. Rise time is fast, idling time is zero.

Heating area is wide, heating and drying was able to uniformly throughout. Radiation frequency band of infrared, so wide, I could be satisfied without replacing the heater also new material.

Applications of Ir Panel Heater

No.15 Heating of the LCD cover glass.



《 Problem Point 》

Rubber was not drying, and it was troubled by the temperature close to the sub-zero winter.

《 ⇒Kaizen Point 》

It was heated by the far-infrared heater which temperature rise of the high speed.

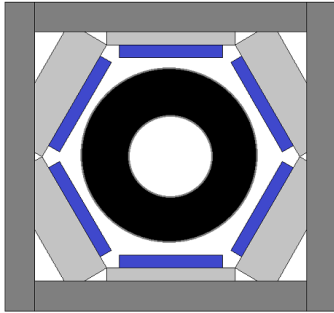
Rise time is fast, tact time loss also do not mind idling time is zero.

Heating area is wide, heating and drying was able to uniformly throughout.

Radiation frequency band of infrared, so wide, I could be satisfied without replacing the heater also new material.

Applications of Ir Panel Heater

No.16 Multistage heating of tire



《 Problem Point 》

We needed a heater with good responsiveness capable of multistage heating

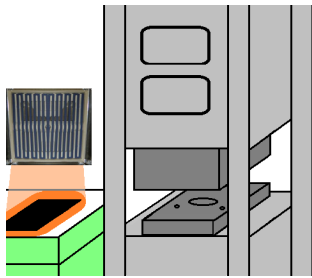
《 ⇒Kaizen Point 》

Heating with a momentary temperature rise far-infrared panel heater PHX.

Since it can follow chemical changes, PHX was able to do a moderate baking, improving the quality of the tire.

Applications of Ir Panel Heater

No.17 Preheating of prepreg



《 Problem Point 》

There was no heater which can heat the entire body uniformly.

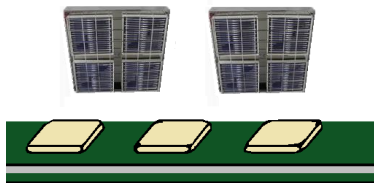
《 ⇒Kaizen Point 》

Heated with far infrared panel heater PHX.

Since PHX is a panel heater, PHX is able to heat the whole uniformly.

Applications of Ir Panel Heater

No.18 Heating of wool



《 Problem Point 》

We were looking for a heater that can heat steadily without contact.

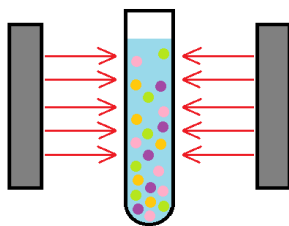
《 ⇒Kaizen Point 》

Heated with far infrared panel heater PHX.

Since PHX is a panel heater, PHX is able to heat the whole uniformly.

Applications of Ir Panel Heater

No.19 Heat synthesis of proteins



《 Problem Point 》

We were looking for a heater that can heat steadily without contact.

《 ⇒Kaizen Point 》

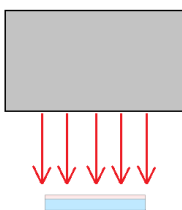
Heated with far infrared panel heater PHX.

Since temperature control can be done in increments of 1°C, the optimum conditions can be confirmed.

Moreover PHX is excellent in reproducibility, quantitative data could be output even in additional tests.

Applications of Ir Panel Heater

No.20 Promotion of plastic polymerization



《 Problem Point 》

We were looking for a heater that can heat steadily without contact.

《 ⇒Kaizen Point 》

Heated with far infrared panel heater PHX.

Since temperature control can be done in increments of 1°C, the optimum conditions can be confirmed.

Moreover PHX is excellent in reproducibility, quantitative data could be output even in additional tests.

Instantaneous Heating, Infrared Panel-Heater PHX

PHX is the panel heater of high-speed heating which reaches to 650 °C in only 15 seconds. The large quantity of heat radiated quickly.



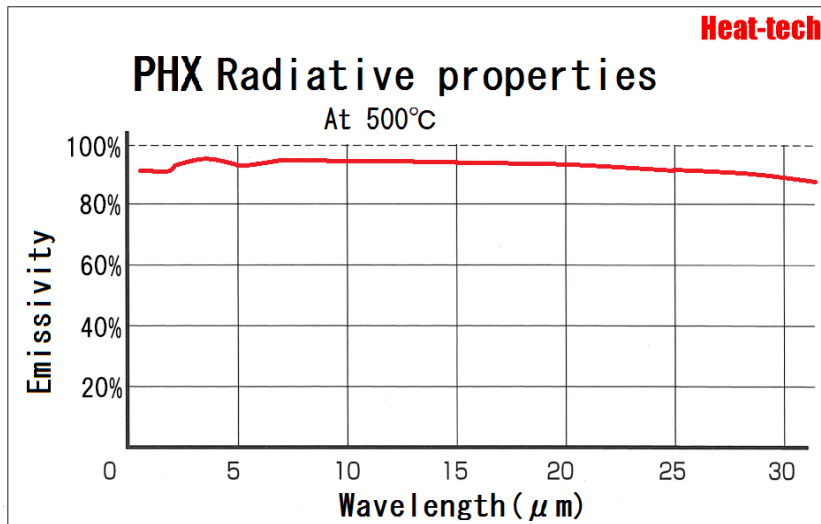
The idling time applied for 30 minutes until now is made to zero.
The cost of the electric usage fee is also cut down.
Furthermore, the amount of annual discharge of CO2 is also reduced!

■ Feature

1. Excellent the radiation wavelength characteristic!

Efficiency of the heat radiation, the most increase in absorption when the wavelength matches the emission wavelength of the heater and the heating object.

PHX is a high emitter close to a perfect radiator (emissivity 0.95) at any wavelength in the efficient, uniform heating and drying is possible in a short time. Convey large amounts of heat at high speed, miniaturization of equipment, heating and drying time can be shortened.



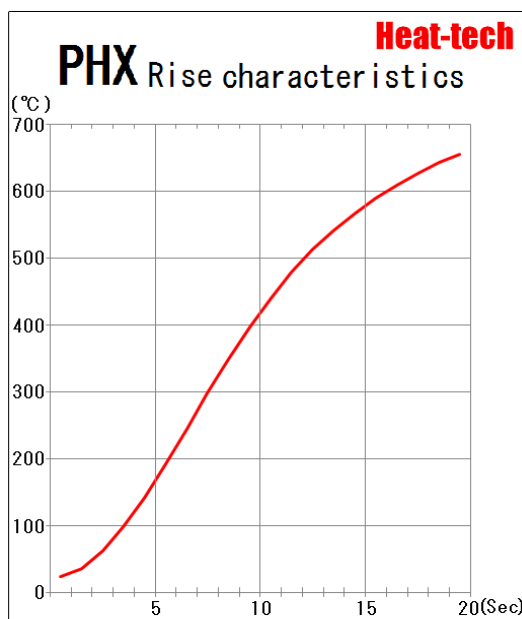
2. Shortening of heating time

PHX becomes the highest temperature in about 20 seconds.

Compared to conventional ceramic heater, Rise and Fall can be rapid.

Since there is no time lag of rise temperature, the futility of time is excluded.

Temperature rise so fast, it can turn OFF the power at idle time. Save money on electricity cost.



3. Temperature distribution is uniform.

Gridiron pattern in the surface has good radiation distribution.

In addition, two sets or four sets of panel heaters are independent, well within the surface temperature distribution can be heated to a uniform temperature of the heated object.

4. Clean

Special ceramics were coated to the metal heating element.

This panel heater consists of ceramic heaters and ceramic cases with dust-free infrared emission ceramics.

5. Highly precise temperature control

The sensor embedded at the heater controls the temperature of a thing to be heated with high precision.

6. Longlife

Since this heater is ceramic material stable to the thermal shock, there is no fear of destruction by rapid heating and rapid cooling. Moreover, high temperature can be used continuously, and there are no declines of emissivity by deterioration with aging.

7. High Safety

When trouble occurs, the heater temperature drops quickly, reducing the risk of ignition of the heating.

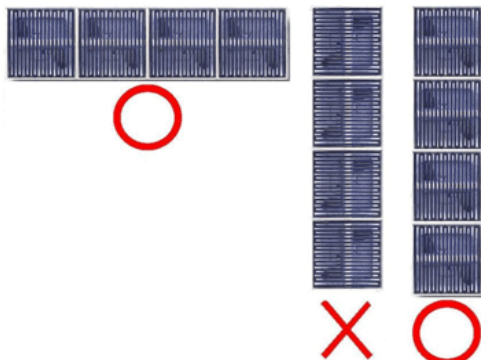
【Specification】

D/#	Voltage	Watt	W	H	D	Recommended Controller
PHX1-50V-690W/K	AC50V	690W	150	150	90	HCA-AC220V/AC50V-15A
PHX2-100V-1380W/K	AC100V	1380W	300	150	90	HCA-AC220V/AC100V-15A
PHX3-150V-2070W/K	AC150V	2070W	450	150	90	HCA-AC220V/AC150V-15A
PHX4-200V-2760W/K	AC200V	2760W	600	150	90	HCA-AC220V/AC200V-15A
PHX5-220V-2670W/K	AC220V	2670W	750	150	90	HCA-AC220V-15A
PHX6-150V-4140W/K	AC150V	4140W	900	150	90	HCA-AC220V/AC150V-30A
PHX8-200V-5250W/K	AC200V	5250W	1200	150	90	HCA-AC220V/AC200V-30A
PHX12-200V-8280W/K	3PAC200V	8280W	1800	150	90	HCA-3PAC220V/AC200V-60A
PHX□-□V-□W/K	Special Order Specifications			150	90	Special Order Specifications
PHX2x2-200V-2760W/K	AC200V	2760W	300	300	90	HCA-AC220V/AC200V-15A
PHX2x3-150V-4140W/K	AC150V	4140W	300	450	90	HCA-AC220V/AC150V-30A
PHX2x4-200V-5250W/K	AC200V	5250W	300	600	90	HCA-AC220V/AC200V-30A
PHX3x4-200V-8280W/K	3PAC200V	8280W	450	600	90	HCA-3P-AC200V-60A
PHX□x□-□V-□W/K	Special Order Specifications					Special Order Specifications

[Common specification]

Termocouple K type	Bult-in
Heater surface allowable temperature	650°C
Heater backside allowable temperature	180°C

* PHX has the mounting direction. When mounting stand, please mounting heating element vertically



【 Infrared Absorption Rate 】

Please confirm the index of absorption of infrared rays in this table.

The material absorbed by about 0.5 = 50% or more is suitable for the infrared heating.

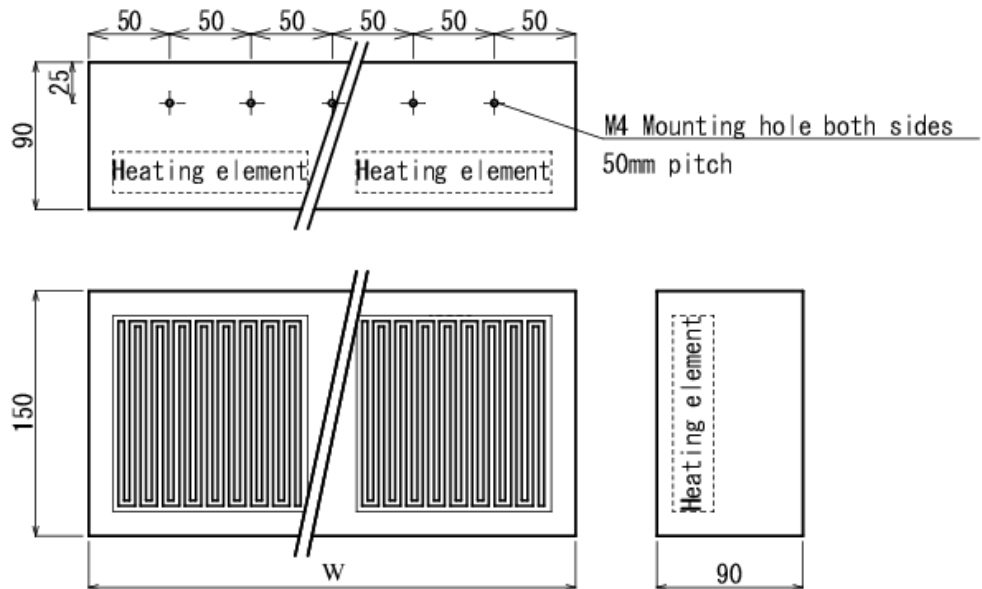
【 Organism 】	Infrared absorption rate(=Emissivity)				
Wavelength	1	1.6	2.4	3~5	8~14
Material	μm	μm	μm	μm	μm
Human skin					0.98
Natural wood				0.9-0.95	0.9-0.95
Charcoal					0.96
Carbon soot	0.95	0.95		0.95	0.95~0.97
Carbon graphite	0.85	0.85	0.85	0.85	0.8
Silicon carbide				0.9	0.9
Paper black					0.9
Paper black matted					0.94
Paper green					0.85
Paper red					0.76
Paper white					0.7~0.9
Paper yellow					0.72
Cloth black					0.98
Cloth high gauge knit	0.75	0.8	0.85	0.85	0.95
Plastic				0.60~0.95	0.95
Asphalt	0.85	0.85		0.9	0.85
Tar					0.79~0.84
Tar paper					0.91~0.93
General Paint				0.87-0.96	
Lacquer bakelite					0.93
Lacquer black matted					0.96~0.98
Lacquer glossy black spray iron					0.87
Lacquer white luster					0.8~0.95
Shellac black matted					0.91
Shellac black luster					0.82
Aluminum paint				0.69	
Rubber Hard				0.9	0.95
Rubber Gray Soft				0.86	0.86

【 Mineral 】	Infrared absorption rate(=Emissivity)				
Wavelength	1	1.6	2.4	3~5	8~14
Material	μm	μm	μm	μm	μm
Granular silica powder					0.48
Silica powder					0.3
Polished glass surfaces				0.91-0.96	
Pottery				0.86	0.92
Porcelain pottery					0.70~0.75
Ceramic	0.4	0.5	0.85-0.95	0.95	0.9
Alumina Al2O3	0.3	0.3	0.3	0.4	0.6
Brick Red	0.8	0.8	0.8	0.93	0.9
Brick White Fireproof	0.3	0.35			0.8
Brick Silica	0.55	0.6			0.8
Brick Sillimanite	0.6	0.6			0.6
Asbestos	0.9	0.9		0.9	0.85
Mud					0.9-0.98
Unglazed clay					0.91
Raw clay				0.85-0.95	0.95
Concrete	0.65	0.7	0.9	0.9	0.9
Cement					0.54-0.96
Gravel				0.95	0.95
Sand				0.6-0.9	0.6-0.9
Coarse emery					0.85
Basalt				0.7	0.95
Polished gray marble					0.93
Mica					0.72
Limestone				0.4-0.98	0.98
Plaster				0.4-0.97	0.8-0.95
Stucco					0.91
Snow					0.8-0.9
Water thickness least 0.1mm				0.96	0.95~0.98
Ice				0.96	0.98

【 Magnetic metal 】					
Infrared absorption rate(=Emissivity)					
Wavelength	1	1.6	2.4	3~5	8~14
Material	μm	μm	μm	μm	μm
Iron non-oxidation side	0.35	0.3		0.18	0.1
Iron oxidation side	0.85	0.85	0.85	0.85	0.8
Iron rust side		0.6-0.9			0.5-0.7
Iron melt	0.35	0.4-0.6			
Cast iron grinding side				0.21	
Cast iron oxidation side	0.85			0.58	0.6-0.95
Cast iron non-oxidation side	0.35	0.3			0.2
Cast iron melt	0.35	0.3-0.4			0.2-0.3
Steel cooling roll	0.8-0.9	0.8-0.9			0.7-0.9
Steel grinding seat	0.35	0.25		0.07	0.1
Steel melt	0.35	0.25-0.4			
Steel oxidation side	0.8-0.9	0.8-0.9			0.7-0.9
Stainless steel	0.35	0.2-0.9			0.1-0.8
Inconel non-oxidation side	0.3	0.3	0.3	0.28	0.1
Inconel oxidation side	0.85	0.85	0.85	0.85	0.85
Inconel Sand blast	0.3-0.4	0.3-0.6			0.3-0.6
Inconel grinding side	0.2-0.5	0.25			0.15

【 Precious / Nonferrous metal 】					
Infrared absorption rate(=Emissivity)					
Wavelength	1	1.6	2.4	3~5	8~14
Material	μm	μm	μm	μm	μm
Platinum	0.27	0.22	0.18	0.1-0.04	0.07
Gold	0.05	0.02	0.02	0.02	0.02
Silvery grinding side				0.02	
Silver non-oxidation side	0.01	0.01	0.01		0.01
Silver oxidation side	0.05	0.04	0.04	0.03	0.02
Copper mirror side				0.02	
Copper non-oxidation side	0.06	0.05	0.04	0.04	0.03
Copper rough side		0.05-0.2		0.072-0.50	
Copper oxidation side	0.85	0.85	0.85	0.85	0.8
Brass specular				0.052	
Brass non-oxidation	0.2	0.18		0.1	0.03
Brass oxidation side	0.7	0.7	0.7	0.46-0.61	0.6
Lead non-oxidation side	0.35	0.28		0.16	0.13
Lead rough side	0.65	0.6			0.4
Lead oxidation side	0.65	0.65	0.65	0.63	0.65
Lead grinding side				0.05	
Tin non-oxidation side	0.25-0.4	0.1-0.28	0.12	0.09	0.06
Tin oxidation side	0.6	0.6	0.6		0.6
Tin luster side				0.05	
Zinc non-oxidation side	0.5	0.32	0.1	0.05	0.04
Zinc oxidation side	0.6	0.55		0.11	0.3
Zinc galvanization steel board				0.23	
Aluminum specular				0.02	
Aluminum usual grinding side				0.04	
Aluminum non-oxidation side	0.13	0.09	0.08	0.05	0.025
Aluminum oxidation side	0.4	0.4	0.4	0.08-0.3	0.35
Aluminum alloy A3003 rough side	0.2-0.8	0.2-0.6			0.1-0.3
Aluminum alloy A3003 grinding side	0.1-0.2	0.02-0.1			
Aluminum alloy A3003 oxidation side		0.4			0.3

【 Rare earth 】					
Infrared absorption rate(=Emissivity)					
Wavelength	1	1.6	2.4	3~5	8~14
Material	μm	μm	μm	μm	μm
Mercury		0.05-0.15			
Titanium non-oxidation side	0.55	0.5	0.42	0.3	0.15
Titanium oxidation side	0.8	0.8			0.6
Tungsten	0.39	0.3	0.2	0.13	0.06
Tungsten grinding side	0.35-0.4	0.1-0.3		0.04	
Palladium	0.28	0.23		0.08	0.05
Rhodium	0.25	0.18		0.07	0.05
Molybdenum non-oxidation side	0.33	0.25		0.07	0.1
Molybdenum oxidation side	0.8	0.8	0.8	0.8	0.8
Magnesium non-oxidation side	0.27	0.24	0.2	0.12	0.07
Magnesium oxidation side	0.75	0.75	0.75		0.75
Magnesite			0.6		
Monel non-oxidation side	0.25	0.22	0.2	0.1	0.1
Monel oxidation side	0.7	0.7	0.7	0.45	0.7
Cobalt non-oxidation side	0.32	0.28		0.18	0.04
Cobalt oxidation side	0.7	0.65			0.35
Nickel non-oxidation side	0.35	0.25		0.15	0.04
Nickel oxidation side	0.85	0.85			0.85
Nickel grinding side				0.05	
Nickel electrolysis	0.2-0.4	0.1-0.3			
Chrome non-oxidation side	0.43	0.34		0.15	0.07
Chrome oxidation side	0.75	0.8			0.85
Nichrome non-oxidation side	0.3	0.28			0.2
Nichrome oxidation side	0.85	0.85	0.85	0.9-0.95	0.85
Nichrome grinding side				0.08	
Nichrome luster side				0.65	

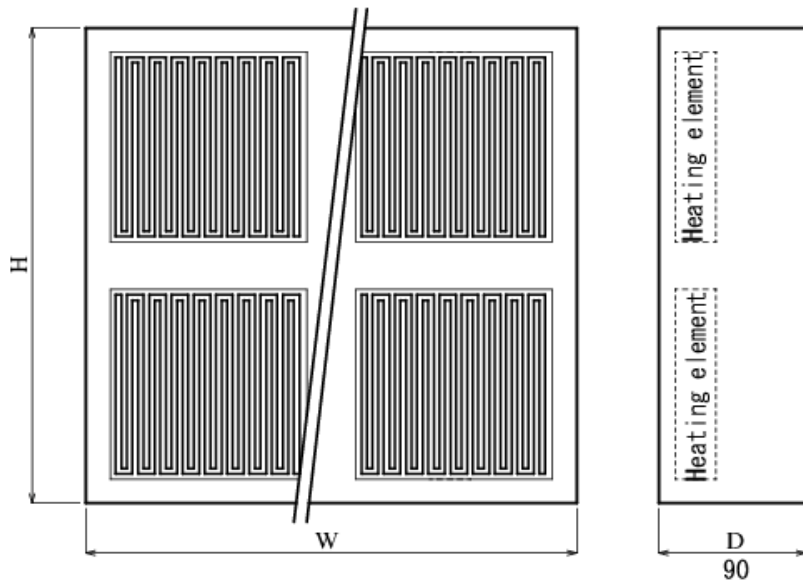
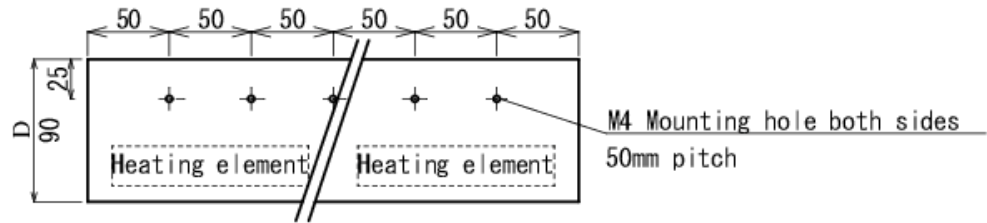


D/#	Voltage	Watt	W	H	D	Recommended Controller
PHX1-50V-690W/K	AC50V	690W	150	150	90	HCA-AC220V/AC50V-15A
PHX2-100V-1380W/K	AC100V	1380W	300	150	90	HCA-AC220V/AC100V-15A
PHX3-150V-2070W/K	AC150V	2070W	450	150	90	HCA-AC220V/AC150V-15A
PHX4-200V-2760W/K	AC200V	2760W	600	150	90	HCA-AC220V/AC200V-15A
PHX5-220V-2670W/K	AC220V	2670W	750	150	90	HCA-AC220V-15A
PHX6-150V-4140W/K	AC150V	4140W	900	150	90	HCA-AC220V/AC150V-30A
PHX8-200V-5250W/K	AC200V	5250W	1200	150	90	HCA-AC220V/AC200V-30A
PHX12-200V-8280W/K	3PAC200V	8280W	1800	150	90	HCA-3PAC220V/AC200V-60A
PHX□-□V-□W/K	Special Order Specifications			150	90	Special Order Specifications

[Common specification]

Termocouple K type	Bult-in
Heater surface allowable temperature	650°C
Heater backside allowable temperature	180°C

Date	Drawing number	Model	Far-infrared Panel Heater
2024. 12. 25	PHX-E11	Heat-tech Co.,Ltd.	



D/#	Voltage	Watt	W	H	D	Recommended Controller
PHX2x2-200V-2760W/K	AC200V	2760W	300	300	90	HCA-AC220V/AC200V-15A
PHX2x3-150V-4140W/K	AC150V	4140W	300	450	90	HCA-AC220V/AC150V-30A
PHX2x4-200V-5250W/K	AC200V	5250W	300	600	90	HCA-AC220V/AC200V-30A
PHX3x4-200V-8280W/K	3PAC200V	8280W	450	600	90	HCA-3P-AC200V-60A
PHX□x□-□V-□W/K	Special Order Specifications				Special Order Specifications	

[Common specification]

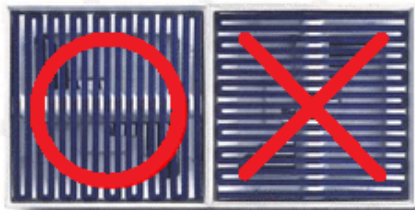
Termocouple K type	Bult-in
Heater surface allowable temperature	650°C
Heater backside allowable temperature	180°C

Date	2024. 12. 25	Model	Far-infrared Panel Heater
Drawing number	PHX-E12	Heat-tech Co.,Ltd.	

【 NOTES – Safe operation 】



- 1) Please be careful so that a hand doesn't touch a heater at the time of the turning on time and heating. It may be burned for high temperature.
- 2) Please be sure to ground a furnace object and a frame.
- 3) The highest specification temperature of PHX series is to 750 °C (it is 650 °C with a sensor). Since there is a possibility of exceeding specification temperature when the heater side has been arranged the time of being faced and used, and in a furnace, please perform temperature control.
- 4) When arranged in a furnace, a temperature on the back (terminal side) PHX□-T series (with a sensor) Please take into consideration to structure or cooling to become 180 °C or less. When you use it above 180 °C, please ask after selecting a sensor-less type.
- 5) PHX series is not explosion proof. When flammability and explosive gas occur to heating and in case of dryness, please do security measures of an exhaust.
- 6) Please contact neither the direct heating subject nor metal to the heating element during turning on electricity. There is possibility of the ignition based on a short circuit or Short.
- 7) Please select the board thickness of the PHX series attachment board within 2 mm.
- 8) There is the attachment direction in PHX series. When it is perpendicular and you attach, please attach the heating element perpendicularly.



- 9) When many PHX series is put in order and it is used, please detach a center pitch not less than 150 mm.
- 10) Please be sure to use attached terminal reinforcement metal fittings for the wire connection of the electric wire of a terminal part. Please be careful for a tag block not to bend.
- 11) In wiring in a furnace, please use heat-resistant electric wires, such as a glass coating silicon rubber insulated wire (Siegel line) or Teflon covering electric wire.
- 12) The infrared rays cannot carry out the visual check of the febrile state. Please check the temperature of the heater or the heating subject with a thermometer.
- 13) Since far-infrared light is the same going-straight light as sunlight, if neither the heating subject nor the dry subject is irradiated directly, it does not have an effect. While reversal, rotation, etc. make the course change depending on work form, far-infrared rays should hit uniformly.

No-touch High Temperatures Hating

Heat-tech

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