

A collage of six images showing various industrial lighting fixtures and equipment. The images are arranged in a 2x3 grid, with each image occupying one of the six squares. The background of the collage is a solid color, alternating between red and orange. The images include: 1. A circular array of many small, rectangular light modules. 2. A linear strip of light modules mounted on a metal frame. 3. A close-up of a light fixture with a metal housing and a glass cover. 4. A linear strip of light modules mounted on a metal frame. 5. A close-up of a light fixture with a metal housing and a glass cover. 6. A close-up of a light fixture with a metal housing and a glass cover.

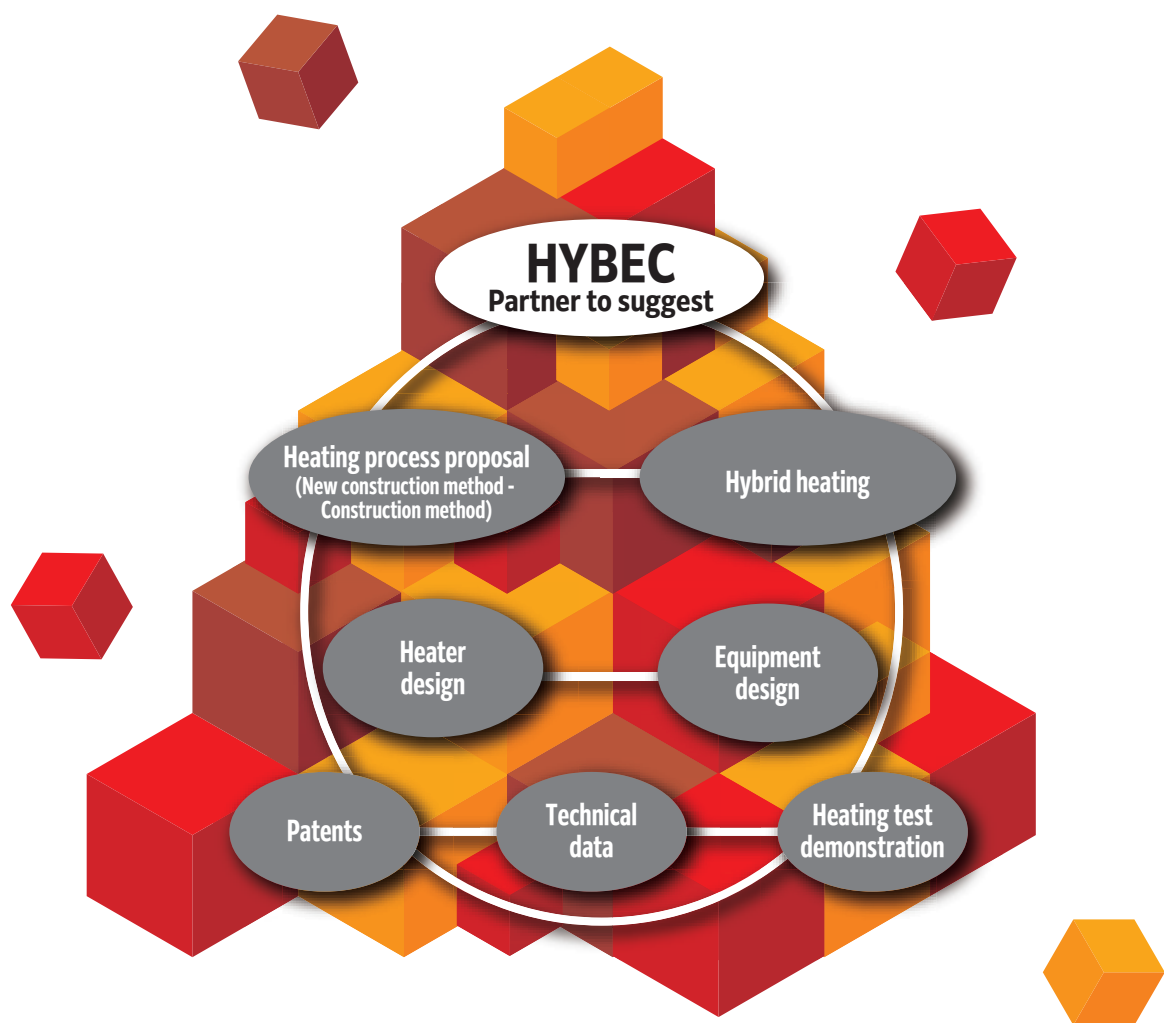


HYBEC
CORPORATION

HYBEC We conduct engineering light and heat

Over the years, HYBEC's extensive experience and technological capabilities have helped to increase productivity, save space and save energy.

HYBEC will continue to provide fresh information and be the best partner to improve the heating process while emphasizing customer communication



Best Solution Partner

We conduct experiments and verifications based on the customer's issues and topics to propose the optimal heating method. To manufacture and supply heating equipment tailored to specific purposes, we can consider equipment without waste. We also provide after-sales service after delivery.



Characteristics of the Near-Infrared Heating System

Infrared radiation is a type of electromagnetic wave. The phenomenon of an object emitting heat is called radiation.

In this type of heating by radiation (radiant heating), the energy from the heat source is absorbed by the object to be heated in the form of electromagnetic waves (infrared radiation). Therefore, it is possible to heat even in a vacuum because there is no need for direct contact between the heat source and the object to be heated (non-contact heating), and no medium such as gas or fluid is required.

Near-infrared rays, which are close to visible light, are emitted from particularly high heat source temperatures, enabling rapid, high-temperature heating.

1. High power output

High temperature heating

According to Stefan-Boltzmann's Law, the heating capacity of near-infrared (NIR) is much higher than far infrared and hot air with a heater temperature of around 3000° C. The heater temperature is a particularly important factor when high heating capacity is required. (See Chart ①)

2. High efficiency

Energy saving

The near-infrared heater uses high-purity fused quartz with high infrared transmittance, converting 90% of electrical energy into infrared energy. Minimal deterioration over time Combined with gold-plated reflectors, the initial efficiency of energy can be maintained for a long time.

3. Fast response

Fast temperature rise

Fast temperature drop

Precise temperature control

The rise and fall times of the heater are only a few seconds. The excellent rise and fall temperature characteristics increase the response speed during control and enable precise temperature control over a wide temperature range from 50° C to 1200° C (See Chart ②). In addition, power consumption can be reduced because heating can be performed by energizing the heater only when necessary.

4. High energy density

High temperature heating

Space saving

The energy density per unit area is more than four times that of far-infrared heaters. This contributes to space savings in the heating area and rapid high-temperature heating. (See Chart ③)

5. Long service life & stable output

Long service life

Stable output

The High-power near-infrared heaters can have long service life characteristics due to the chemical cycling = halogen cycle. The heater and reflector structural innovation also provides a long-life heater with minimal degradation. (See Chart ④)

6. Stable heat flow

High temperature heating

Stable output

With near infrared heating, the heat flow is absorbed by the heated object during the heating period and the temperature increases further. Hot air heating causes a rapid decrease in heat flow and a significant reduction in heat-raising capacity. (See Chart ⑤)

Near infrared heating = $Q \propto (Th1^4 - Tw^4)$ Power Retention Rate (Relative)

Hot air heating = $Q \propto (Th2 - Tw)$

For near infrared heating, the heat flow is proportional to the difference in temperature between the heater and the object to be heated, to the power of four. In hot air heating, the heat flow is proportional to the temperature difference between the two, and the temperature difference between the hot air temperature and the object to be heated disappears in a short time, so the heat flow is drastically reduced and the object to be heated does not rise.

Near infrared rays are superior in heating performance.

7. Clean heating, vacuum heating

High efficiency

Stable output

Clean

The tungsten heater element is encapsulated in quartz glass, making it dust-free and suitable for use in clean rooms, vacuum atmospheres, and high-purity gas atmospheres.

Chart ① Heater Temperature vs. Wavelength (for the same output)

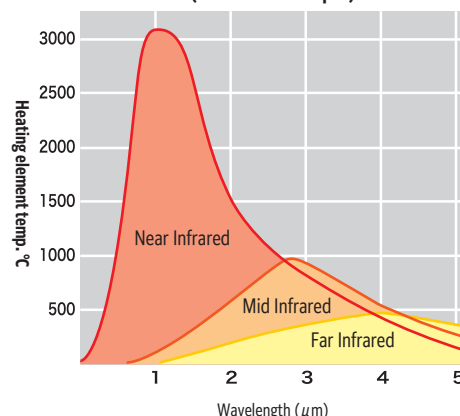


Chart ② Rise-to-fall performance (Solid line: rising edge, dashed line: falling edge)

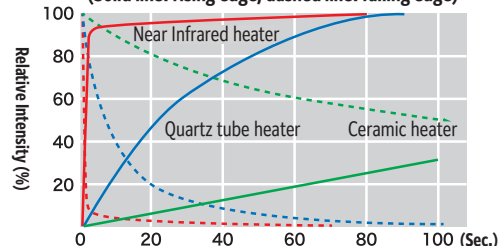


Chart ③ Energy Density

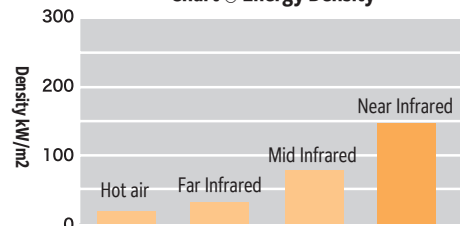


Chart ④ Power retention rate

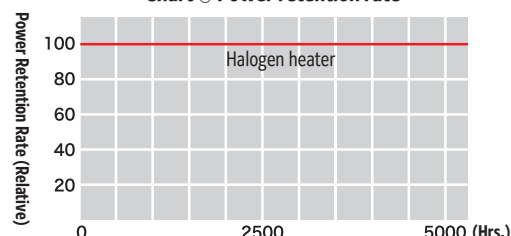
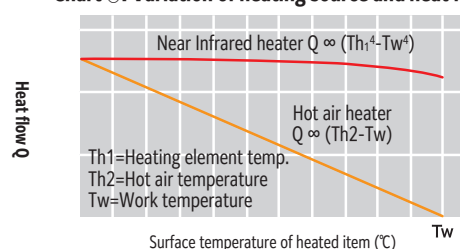


Chart ⑤: Variation of heating source and heat flow



Characteristics of the near infrared rays and the unique technology of HYBEC

1 Hybrid heating

The combination of near-infrared rays and another heat source may lead to the discovery of a new heating process or unexpected ideas for improvement. We will expand the world of heating by taking advantage of each other.

Near infrared

+

Client Facilities

Induction heating

Draft heating

Electric heating

Laser heating

Burner heating

[Case]

Near infrared rays + burner furnace = In the first half of the heating process, burners are used to raise the temperature to a high range at once; in the second half, near infrared rays are used to gradually raise the temperature and improve heat uniformity. Contributes to energy saving and environmental load reduction.

Near infrared + hot air furnace = Near infrared heaters are placed in the preheat zone due to the slow start-up of the hot air furnace alone. This greatly reduces the time required to reach the target temperature.

2 Comparison of infrared heaters

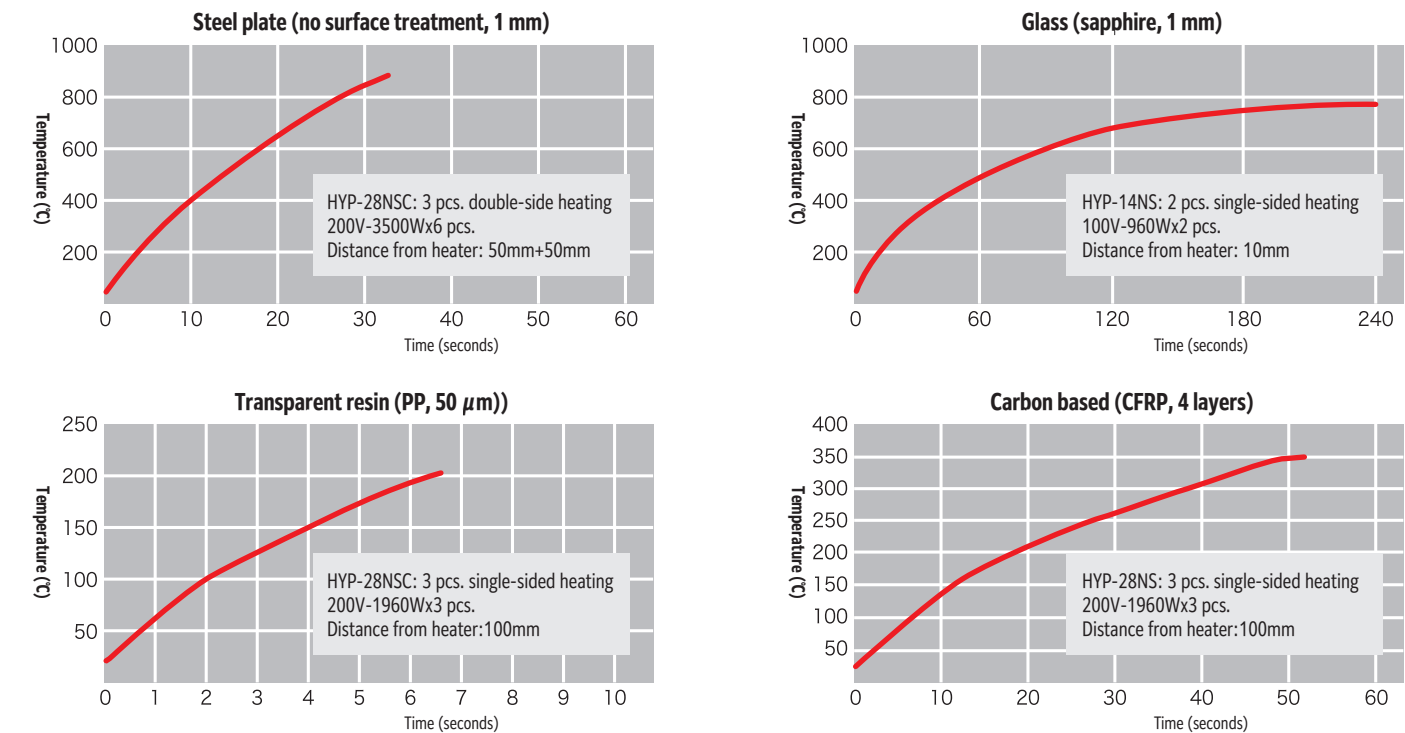
A comparison of the performance and efficiency of far infrared, mid infrared, and near infrared heaters. The characteristics of infrared radiation are 1) high energy efficiency and energy density, 2) fast heater response, and 3) rapid, high-temperature heating capability. For a detailed explanation, refer to the separate "The Book of Five Rings". Download from our homepage, https://www.hybec.co.jp/contact/download_auth.html

	Far Infrared	Mid Infrared		Near Infrared
Heater type	Ceramic panel heaters	Kanthal wire heaters	Carbon heaters	Halogen lamp heaters
With/without reflector (membrane)	No	Yes	Yes	Yes
Energy efficiency	60%	90%	90%	90%
Energy density	30 kW/m	50 kW/M	100 kW/m	More than120 kW/m
Rise time	10 min. or more	3 minutes	3 seconds	1 second
Heat source temperature	500~700℃	800~900℃	800~900℃	2000~3000℃
Peak wavelength	Approx. 4μ	Approx. 2.6μ	Approx. 2.0~2.5μ	Approx. 0.9 ~1.2μ
Average life (hr.)	10,00~20,000 hrs.	20,000~30,000 hrs.	8,000 hrs.	3,000~5,000 hrs.

※The average life of near infrared products is based on our standard heaters. This does not apply to customized products.

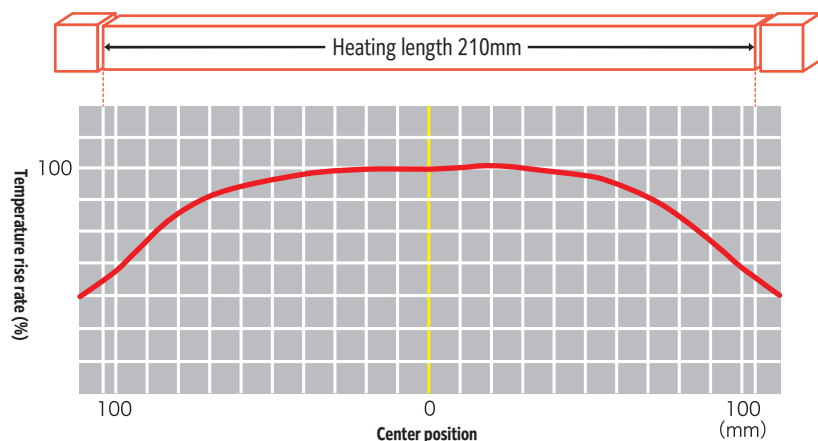
3 Comparison of infrared heaters

If it is necessary to know the exact temperature, we recommend testing in our laboratory. In addition to these four sample profiles, we have other reference materials available. Feel free to contact us for more information.



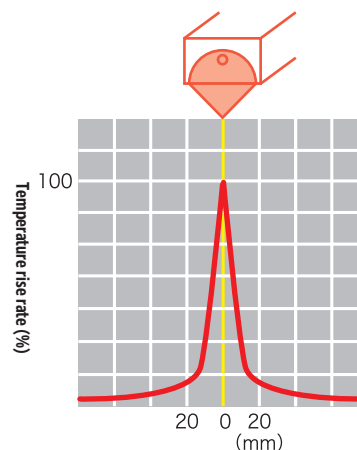
4 Temperature distribution and Ibeam concentration

【Longitudinal temperature distribution chart】



The temperature at both ends of the heater will be slightly lower. The amount of decrease will vary depending on the distance between the heated workpiece and the heater. Use this table as a guide.

【Degree of light collecting】

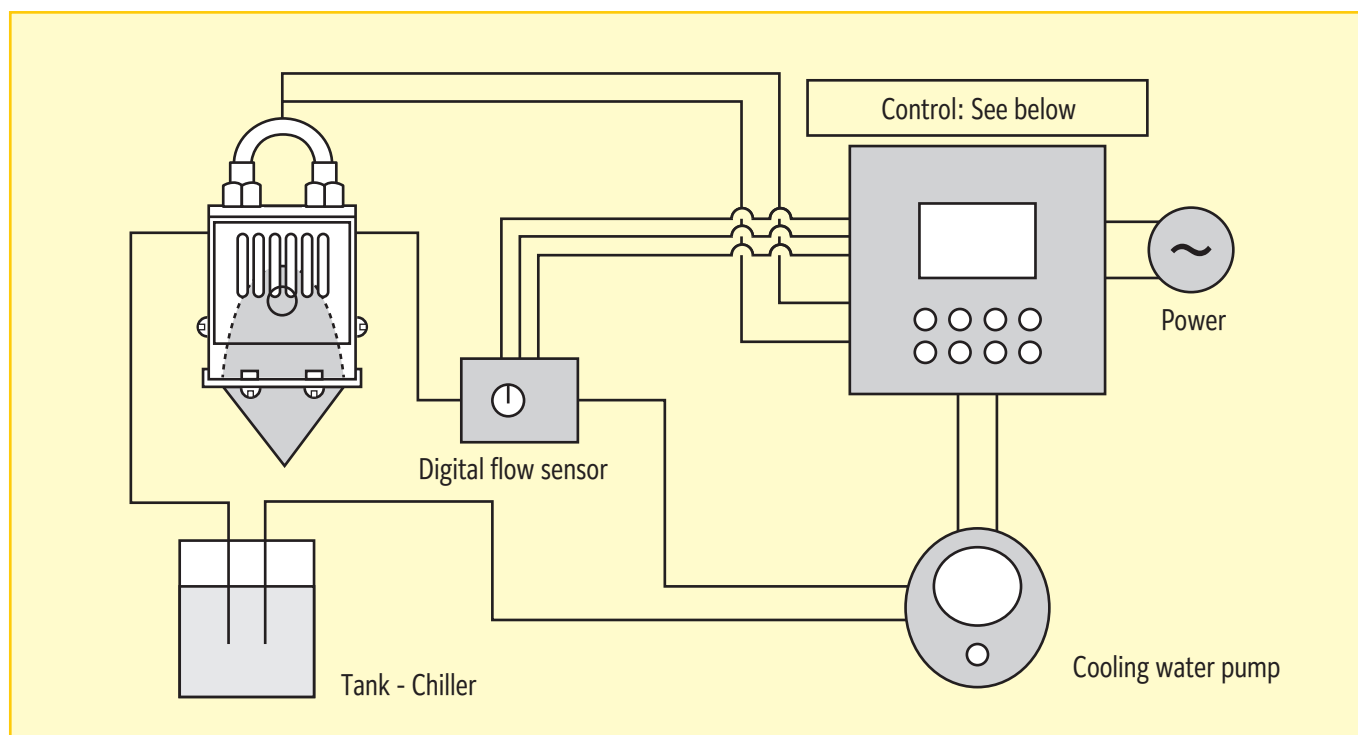


The beam is focused to a width of approximately 2 mm at the focus of the line-focusing type. The focus width varies depending on the type of heater.

*This chart is for illustration only.

System Configuration Chart

- HEAT BEAM is water cooled.
- Circulation flow rate varies by specification.
- Use tap water or factory recirculated water for cooling water.
- Consult us if using a chiller.
- Monitor the amount of cooling water at the heater outlet with a sensor.



- ⚠ For control, see the special heat beam controllers on pages 13 and 14.
- ⚠ We can also manufacture control panels.

Module

Near-infrared heat beam furnaces that can be customized to meet your goals and requirements

We can design custom heat beam furnaces with a combination of gold-plated reflectors and heaters as requested.

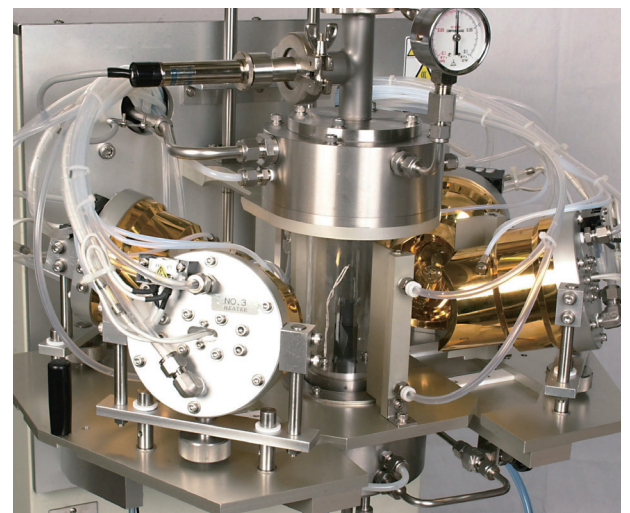
The near-infrared heat beam furnace is a precision-controlled furnace with a much faster heating rate and better controllability than electric furnaces such as kanthal and nichrome furnaces. The system responds instantly to programmed temperature profiles and can repeat with high reproducibility.



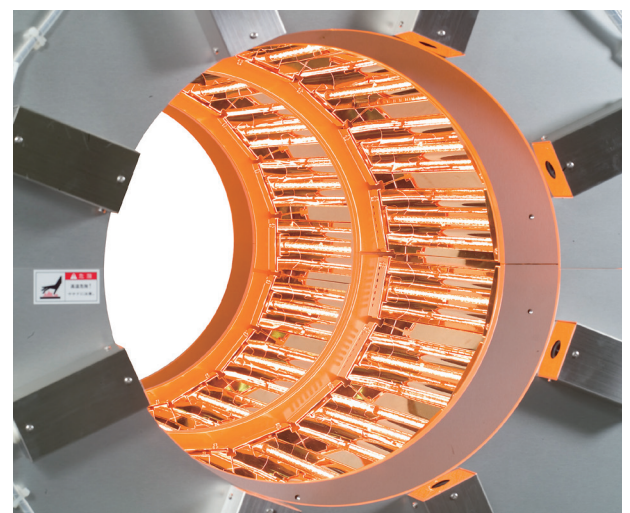
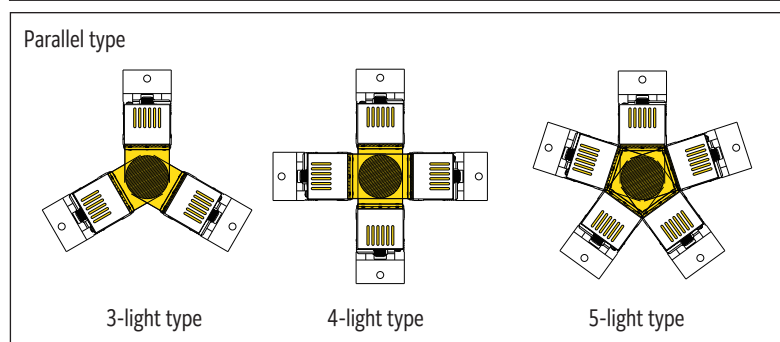
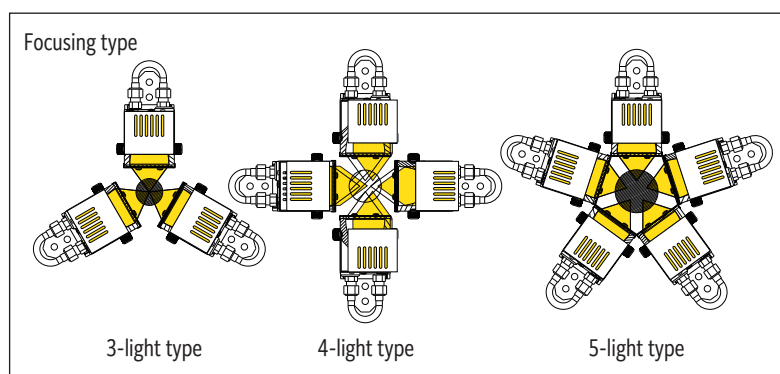
Cylindrical furnace



Parallel irradiation module



Point-focusing vacuum furnace



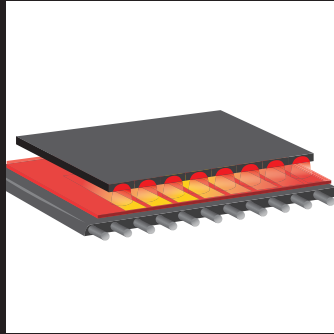
Tubular furnace

Application

Uses that are enhanced by professional skills and ideas

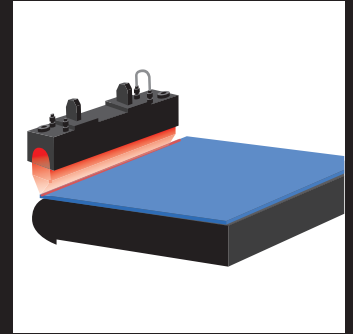
Glass

- Applications: Drying and annealing of glass. Lens molding, cutting process of laminated glass.
- Illustration: The flat panel is rapidly heated and cooled in a clean room by means of a 3 meter-long glass heater.



Woodworking

- Applications: Preheating for laminating, Pre-heating of wood for the drying of glue in the winter.
- Illustration: During the post-forming process, the wood and adhesive are pre-heated.



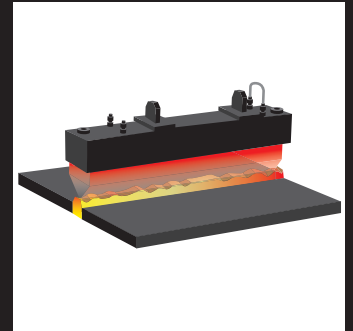
Vacuum furnace

- Applications: Glass sealing, bonding, thermal CVD equipment, vacuum deposition preheat, vacuum test equipment (up to 1500°C), heat sources for semiconductor RTP.
- Illustration: Increase the temperature of the tip of the workpiece in the quartz glass vacuum chamber to 1500 °C.



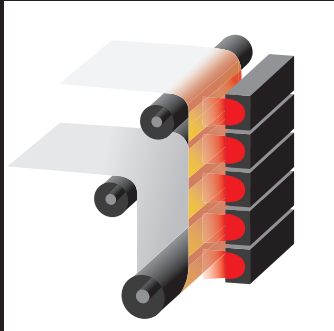
Metalwork

- Applications: Rolling heat treatment, solvent drying process, hot pressing.
- Illustration: Annealing of weld bead.



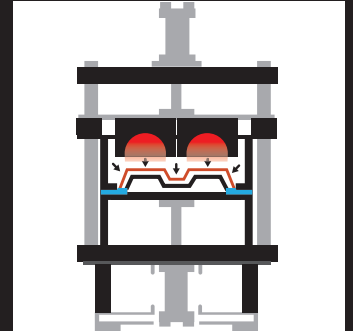
Printing

- Applications: Drying and annealing of glass. Lens molding, cutting process of laminated glass.
- Illustration: The flat panel is rapidly heated and cooled in a clean room by means of a 3 meter-long glass heater.



Carbon Fibers

- Applications: Preheating of thermoplastic resin before molding. Curing of thermosetting resin.
- Illustration: Preheating before press molding.



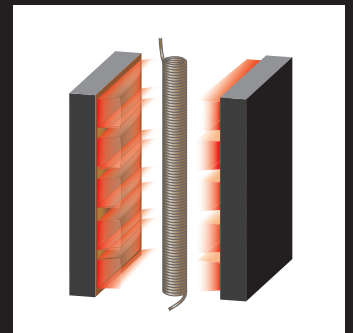
Molding

- Applications: Vacuum molding, resin molding, lens molding.
- Illustration: Rapid temperature increase and decrease for preform heating of PET bottles.



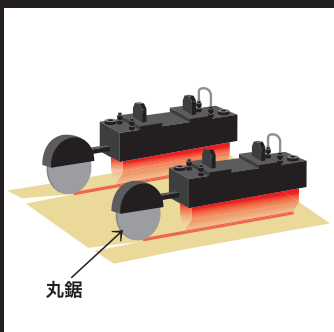
Medical

- Applications: Coil coating drying, coil brazing and soldering, tube shrinkage.
- Illustration: Coil coating drying.



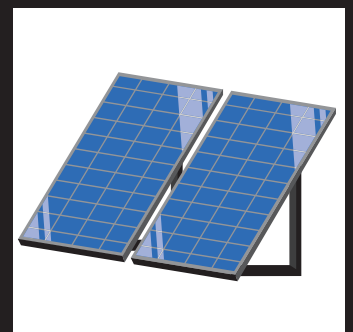
Films and Sheets

- Applications: Rapid local heating of films, water-based drying, preheating for cutting embossed, laminated films and sheets to prevent dust formation.
- Illustration: Preheating of films and prepregs before cutting.



solar cells

- Applications: Soldering, vacuum pack heating, heat treatment equipment.
- Illustration: Tab soldering to cells, conductive adhesive curing.

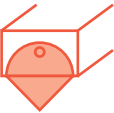


From standard products to custom designs, we can meet your needs

The Near Infrared Heater series is a heating unit that irradiates powerful near infrared rays emitted from a halogen lamp heater with a heating element temperature of up to 3000° C in a linear, parallel, or spot pattern using a reflector to achieve high temperature and rapid heating.

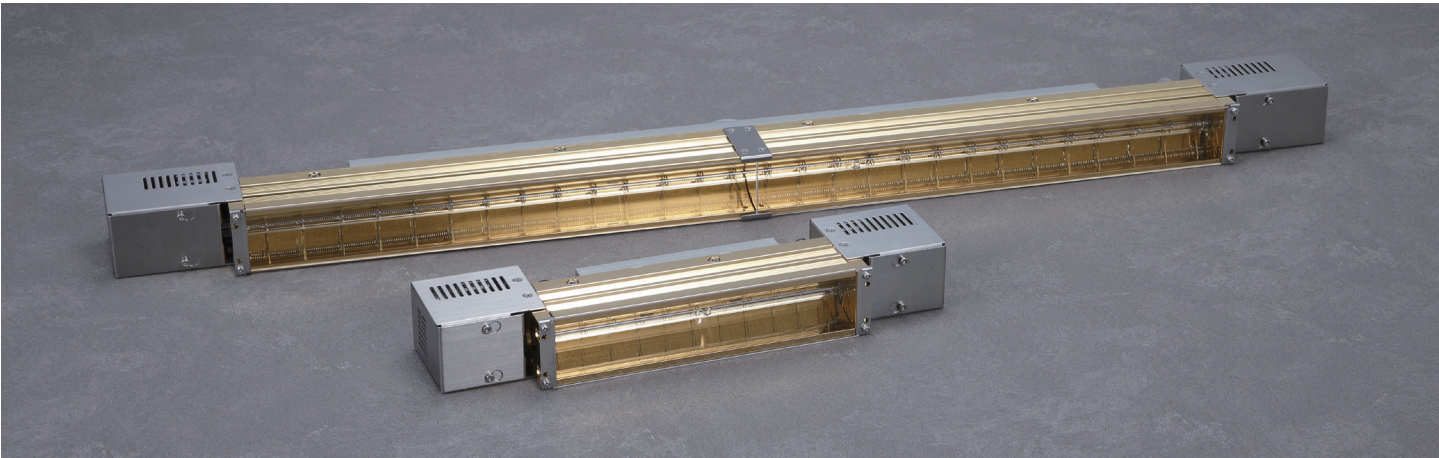
【Features】

- Depending on the shape of the reflector, it is possible to heat a localized area or a flat surface.
- Rise and fall times can be set in seconds for excellent responsiveness.
- Optical heating allows for non-contact, clean heating.
- Can heat workpieces in a vacuum
- High power density enables the downsizing of equipment.



Linear concentrator type HYL series (water-cooled)

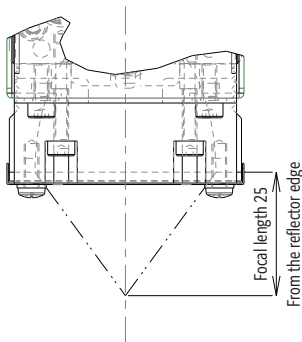
Heater adopting a reflector that concentrates light in a straight line. Suitable for local heating, etc.



Product details

Model	Rated voltage (V)	Rated Power (W)	Overall length A (mm)	Heating length B(mm)	Energy density (W/mm)	Focal length (mm)	Mass (kg)
HYL25-8NIII	100	560	220	80	7	25	1.7
HYL25-14NIII	100	980	280	140	7	25	2.5
HYL25-14NBIII	200	980	280	140	7	25	2.5
HYL25-20NIII	200	1400	340	200	7	25	3.3
HYL25-28NIII	200	1960	420	280	7	25	4.3
HYL25-37NIII	200	2590	510	370	7	25	5.5
HYL25-45NIII	200	3150	590	450	7	25	6.6
HYL25-50NIII	200	3500	674	500	7	25	7.2
HYL25-60NIII	200	4200	774	600	7	25	8.7
HYL25-70NIII	200	4900	874	700	7	25	9.9

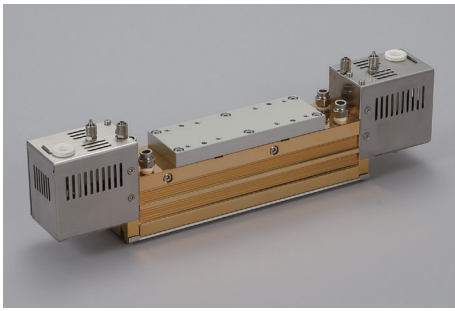
• Remarks: Special orders such as new designs for focal length, heating length, and energy density specifications are available.



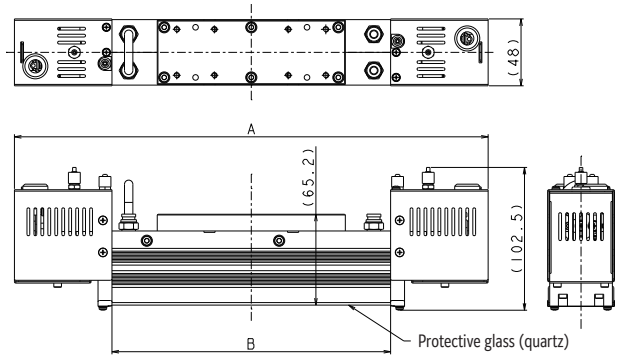
Focal length in the table is the distance from the reflector face to the focal point, as shown at left. Does not include the 1.8 mm thickness of the protective glass on the front of the reflector.

The position of the fixing holes depends on the model. For more information, check out the drawings available to download from the website or contact us.

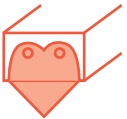
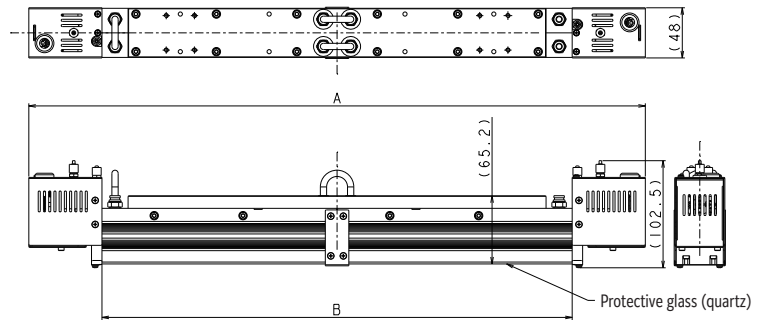
<https://www.hybec.cojp/download/cad-data 1.html>



HYL25-8NIII-37NIII



HYL25-45NIII-70NIII



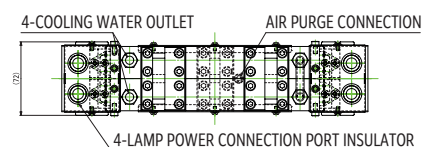
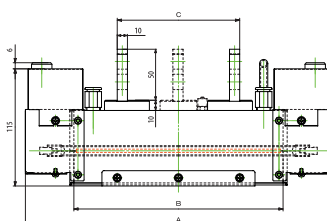
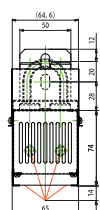
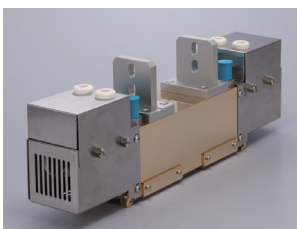
High power twin type water-cooled beam concentrator (custom-ordered)

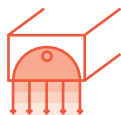
By concentrating the energy of the two heaters into a linear beam, this heater delivers up to twice the energy density of our standard heaters. These heaters are ideal for locations that require rapid heating in a small heated area.

Applications: Embossing and laminating processes - Film and fiber processing processes - Weld bead annealing - Heater roll moisture compensation.

Product details

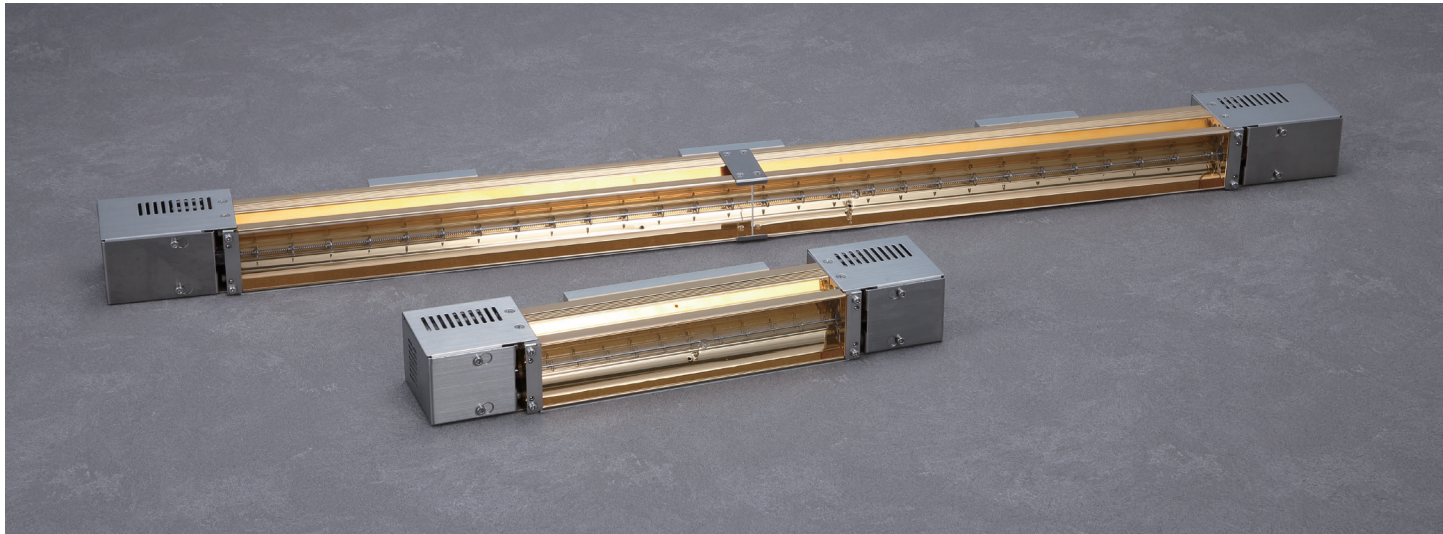
Model	Rated voltage (V)	Rated Power (W)	Overall length A (mm)	Heating length B (mm)	Bracket distance C (mm)	Number of Brackets	Energy density (W/mm)	Energy density (W/mm)
HYL-TWIN-8	100	560×2	180	80	—	1	14	14
HYL-TWIN-14	100	980×2	240	140	—	1	14	14
HYL-TWIN-20	200	1400×2	300	200	120	2	14	14
HYL-TWIN-28	200	1960×2	440	280	200	2	14	14
HYL-TWIN-45	200	3300×2	610	450	370	2	14	14





Parallel Irradiation Type HYP Series

Heater that radiates in parallel. Suitable for heating

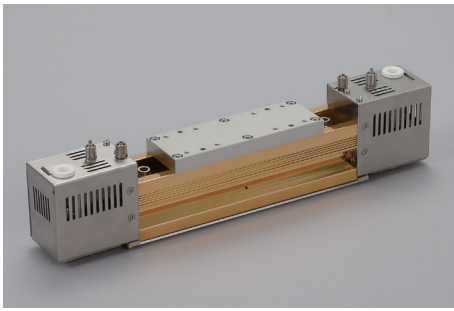


Product details

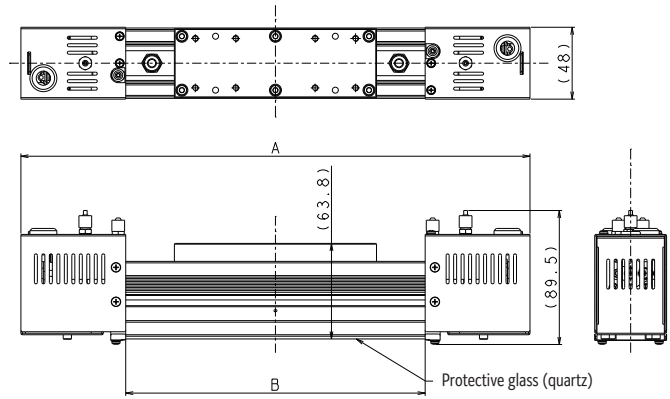
Model	Rated voltage (V)	Rated Power (W)	Overall length A (mm)	Heating length B(mm)	Energy density (W/mm)	Focal length (mm)	Mass (kg)
HYP-8NIII	100	560	220	80	7	25	1.4
HYP-14NIII	100	980	280	140	7	25	2.1
HYP-14NBIII	200	980	280	140	7	25	2.1
HYP-20NIII	200	1400	340	200	7	25	2.7
HYP-28NIII	200	1960	420	280	7	25	3.5
HYP-37NIII	200	2590	510	370	7	25	4.2
HYP-45NIII	200	3150	590	450	7	25	5.0
HYP-50NIII	200	3500	674	500	7	25	5.4
HYP-60NIII	200	4200	774	600	7	25	6.4
HYP-70NIII	200	4900	874	700	7	25	7.4

· Remarks: Special orders such as new designs for focal length, heating length, and energy density specifications are available.

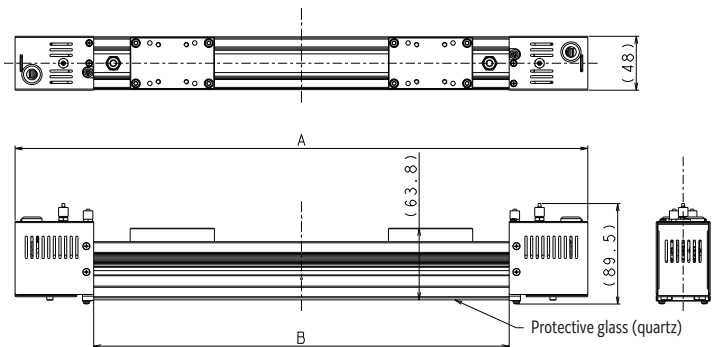
The position of the fixing holes depends on the model. For more information, check out the drawings available to download from the website or contact us.
<https://www.hybec.cojp/download/cad-data 1.html>



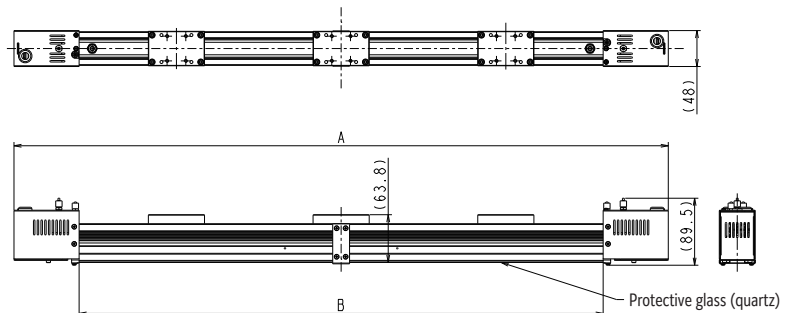
HYP-8N III - 28N III



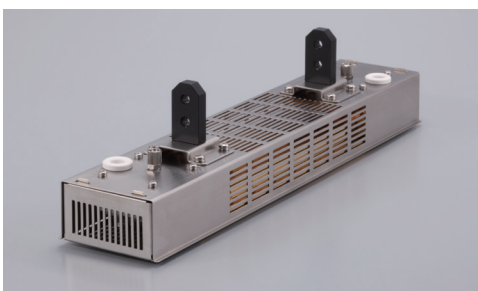
HYP-37N III - 60N III



HYP-70N III



■ Near Infrared Heater Flat Irradiation Type HYM Air Cooled (Custom Order)



Air-cooled reflectors can be used depending on the power required. Consult us to manufacture forced air cooled reflectors with fans or compressed air to increase the cooling capacity of the reflectors.

【Features】

- Reflectors can be cooled naturally or by air-cooling with a fan.
- Accommodates installation environments where cooling water is not available or cannot be prepared.

Point focusing type HYS Series

The powerful near-infrared light is focused on a single point.
This heater unit is suitable for partial rapid heating.



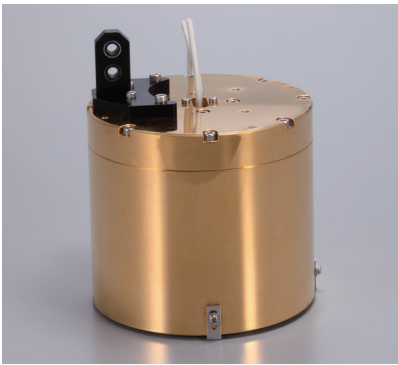
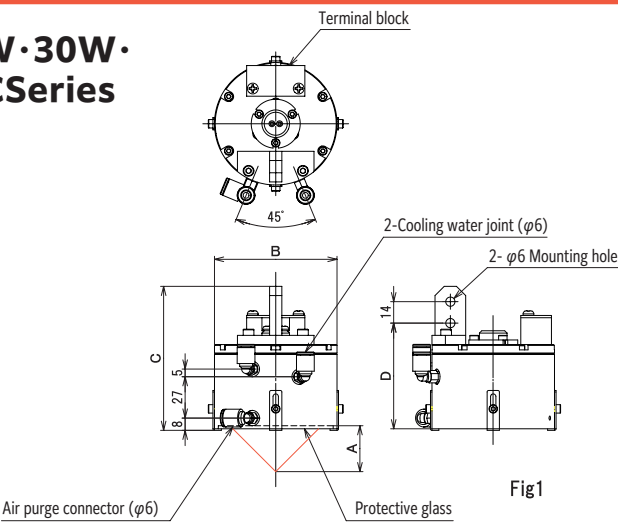
Point focusing type

Product details

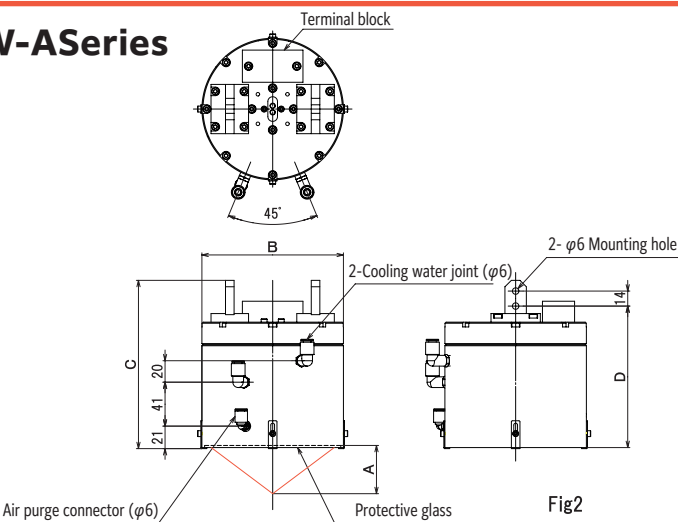
Model	Mountable lamp heater		Overall length A (mm)	Diameter ϕ B (mm)	Height C (mm)	Mounting position D (mm)	Focusing diameter (Ref.) ϕ (mm)	Outline drawing
	Voltage (V)	Power (W)						
HYS-20W-A	14	150	20	80	84	59	3	Fig 1
HYS-20W-B	22	350	20	80	93	68	4	Fig 1
HYS-30W-A	14	150	30	80	94	69	3	Fig 1
HYS-30W-B	22	350	30	80	103	78	4	Fig 1
HYS-45W-A	100 90	750 1800	45	132	157	132	20	Fig 2
HYS-45W-B	14	150	45	80	109	84	3	Fig 1
HYS-45W-C	22	350	45	80	118	93	4	Fig 1



HYP-20W·30W· 45W-B·C Series



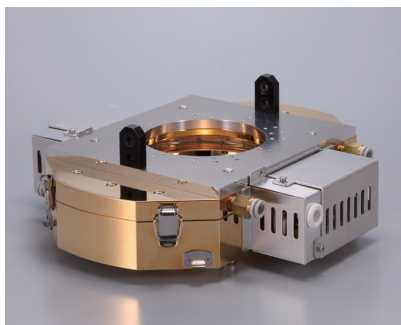
HYP-45W-A Series





Inner periphery light concentration type HYC-IN series

Custom-ordered product



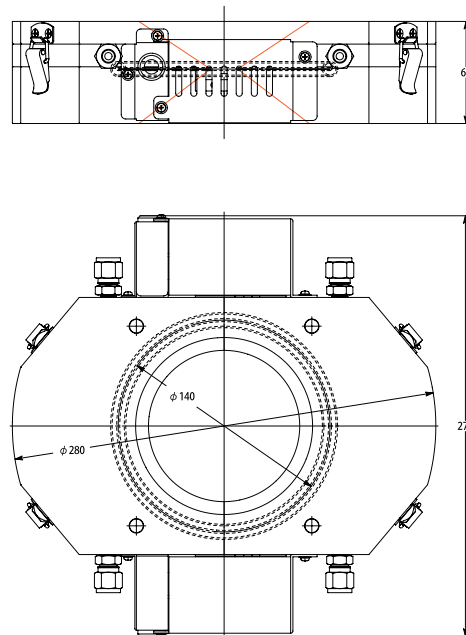
This heater can heat a workpiece from the periphery. It combines a circular halogen lamp with a reflector that focuses the light inward.

Product details

Model	Rated voltage (V)	Rated Power (W)	Overall length A (mm)	Heating length B (mm)
HYP-8NIII	100	560	220	80

*Note: Specifications and dimensions for custom-ordered products are examples of production. Contact us for details.

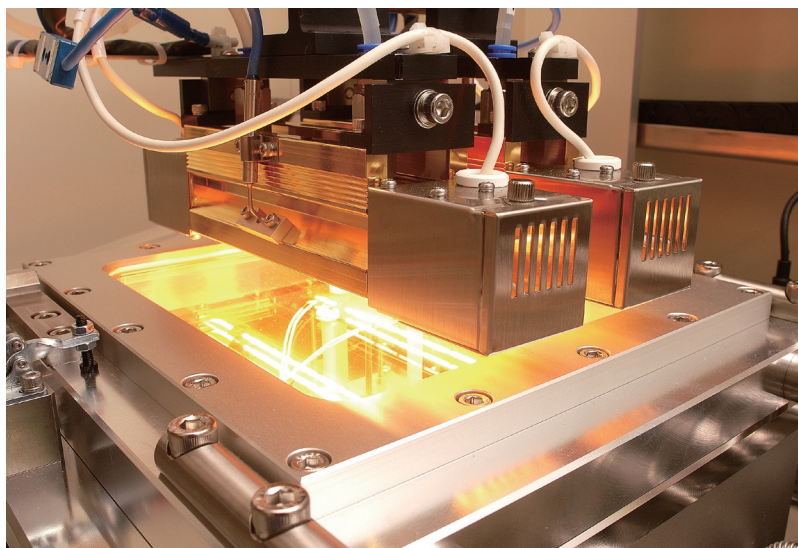
HYC-INSeries



Laboratory

Things previously unseen are revealed in laboratory experiments

HYBEC has been setting up a laboratory for more than 20 years to help people understand what near-infrared heating is all about. Various results produced in the laboratory are now being used in a wide range of industrial and R&D fields. You are welcome to visit us at our laboratory.



Demo machine is available for rent.
We have demo equipment available.
Contact us for more information.

episode1

Significantly reduced resin curing time

One manufacturer needed 30 minutes in a hot air oven at 150°C to cure thermoset resin filled in a metal housing.

In response to the customer's request to reduce this time to 3 minutes, we began experiments.

We were able to reduce the time as requested by the customer by using a hybrid heating system that combines hot air and near infrared rays. The result was a significant increase in productivity.

episode 2

Necessities for embossing and laminating processes

Steam heating and far-infrared heating have been the mainstream in resin sheet processing. However, prolonged heating makes the material too soft and interferes with processing.

This is where near infrared comes in. A single compact heater heats the surface of the sheet to a temperature suitable for processing in a fraction of a second. The back of the material remains at a lower temperature. This system has become indispensable for embossing and laminating.

Controller

Dedicated control unit for the heat beams HYW-30CVR-P

Designed as a dedicated controller for near infrared heaters.

To accommodate various applications, irradiation time and output voltage percentage can be programmed in a single step up to a maximum of 32 steps to achieve optimum heating according to the conditions.

Precise temperature control is possible when used with a dedicated temperature control unit.

※ A connection to a dedicated transformer box is required when using a spot heater with a rated heater voltage of 24 volts or less.



■ Specification

Power supply	AC 100V 50/60Hz 110V/220V specifications also available AC 200V 50/60Hz depending on shipping setting
Load current capacity	30A MAX
Control method	Thyristor phase regulation Constant voltage regulation
Operation program	Number of program registrations 5. Each program 1-32 steps
Alarm function	• Internal Thyristor Fault • Lamp Heater Disconnect • SCR ON response • EMS input • System Error • Sensor abnormal input (coolant circulation abnormal)
Display	LCD panel (touch panel)
External communication	RS485 with serial communication I/F

■ Dimensions

200 mm (W) × 350 mm (D) × 95 mm (H)

Controller HYW - 30CVR-P Specialized software HEAT BEAM PRO

HEAT BEAM PRO is a software that allows you to enter the operating program and various parameter settings of the dedicated controller for near infrared heaters from your PC.

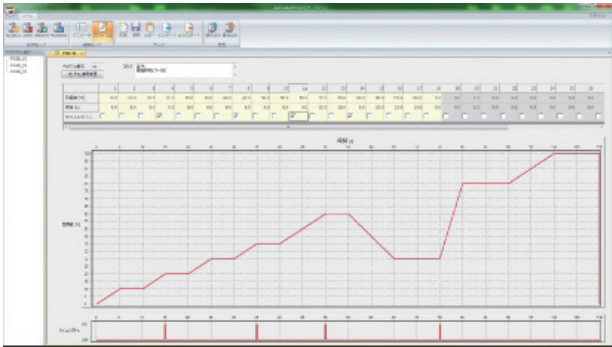


■ Feature

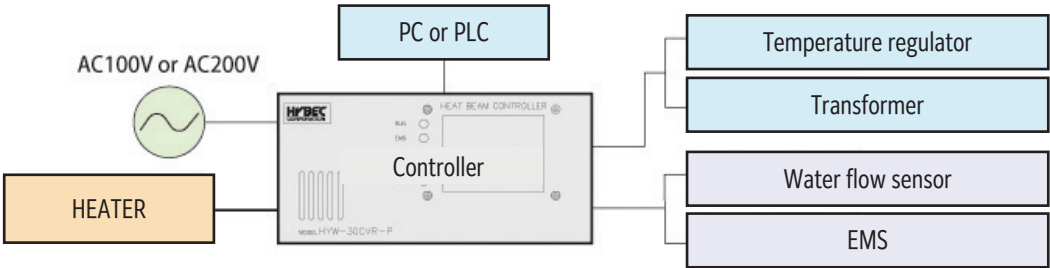
- It's possible to create operating programs for heating power and exposure time. These programs form the heating profile.
- Up to 99 programs can be created.
- Up to 32 steps can be created per program.
- Various parameters, such as the alarm function settings of the controller itself, can also be set.
- The running program can be monitored. Programs can also be selected and executed.

■ Examples of Use

Setting screen to create heating profiles



■ Connection example



Dedicated controller for heat beams HYW-30MR

This controller allows the user to set the current value of the near infrared heater and control the amount of irradiation by simply adjusting the regulator. Suitable for simple applications such as prototyping.



■ Specification

Power supply	AC 100V 50/60Hz 110V/220V specifications also available AC 200V 50/60Hz depending on shipping setting
Load current capacity	30A MAX
Control method	Thyristor phase regulation
Output setting	Volume setting
Display	Output current monitor
Alarm function	• Internal Thyristor Fault

■ External dimensions

200 mm (W) × 350 mm (D) × 95 mm (H)



Safety Precaution

To ensure safe use, be sure to read and understand the "Operating Instructions" carefully before using.



Specifications and appearance are subject to change without notice for improvement.

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