

# NRLM TYPE BLACK BODY FURNACES



## For High Temperature

- Model IR-R27

## For Medium Temperature

- Model IR-R26

## For Low Temperature

- Model IR-R24



The NRLM black body furnaces have been developed as large opening black body furnaces for calibration as a result of the joint research with the National Research Laboratory of Metrology, Japan (NRLM), based on the latest radiation thermometer traceability systems. The reference black body furnaces are prepared for high temperature range (800-1450°C) and medium temperature range (200-1050°C), while the standard black body furnace is prepared for low temperature range (50-450°C).

The black body furnace for high temperature is used for comparison calibration by using a fixed-point-calibration by using a fixed-point calibrated 0.90 or 0.65 $\mu$ m silicon monochromatic radiation thermometer as the standard thermometer.

## ■ FEATURES

### ● High Cavity Emissivity with a Large Opening

The opening diameters are 30mm for high temperature, 50mm for medium temperature, and 60mm for low temperature. The cavity emissivity is evaluated as 0.99, 0.997, 0.993, so that the scales can be calibrated easily with high accuracy.

### ● Excellent Furnace Temperature Stability

The black body furnace for high temperature is stabilized within  $\pm 0.5$ K, the black body furnace for medium temperature is stabilized within  $\pm 0.25$ K, and the black body furnace for low temperature is stabilized within  $\pm 0.15$ K respectively, in about 20 minutes after reached at each preset temperature.

### ● Compact, Lightweight, and Easy-to-operate

These black body furnaces are compact and

The black body furnace for medium temperature range is used for comparison calibration by utilizing a fixed-point calibrated 0.90 $\mu$ m silicon monochromatic radiation thermometer as the standard thermometer, and the black body furnace for low temperature is used for calibration by utilizing a optional built-in platinum resistance thermometer as the standard thermometer.

The cavity is profiled as a double cone having a curve mirror surface reflection effect, and a high calibration accuracy has been realized with a large opening by uniquely designing the furnace body structure and heaters.

Also, these black body furnaces have been designed to be compact and lightweight with low power consumption by taking their operation ease and economy into due consideration.

lightweight to 1/10 as compared with those of conventional CHINO's products, and they can easily be mounted and operated.

### ● Low Power Consumption and Economical

The black body furnaces for low and medium temperature can be operated with a 100V AC commercial power source, while the black body furnace for high temperature is operated with 200V AC. The maximum power consumption is 1200VA (for medium temperature) and 500VA (for low temperature) which are 1/10 as compared with those of conventional CHINO's products.

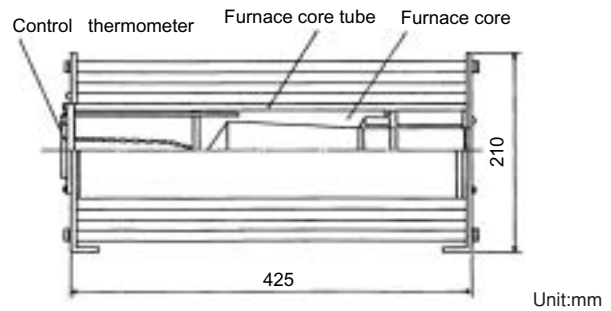
Also, the maximum power consumption is 2500VA (for high temperature).

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## STRUCTURE

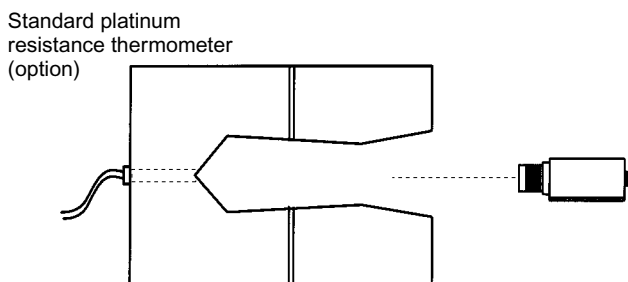
The furnace core is made of a metal having excellent thermal conduction, and a double conic cavity is formed inside. The heaters are embedded along the outer circumference to enhance the thermal efficiency, and arranged to improve the temperature distribution in the cavity.

The furnace temperature is controlled by the pulse type PID system using SSR, and the furnace body and the control system are encased into the same case.

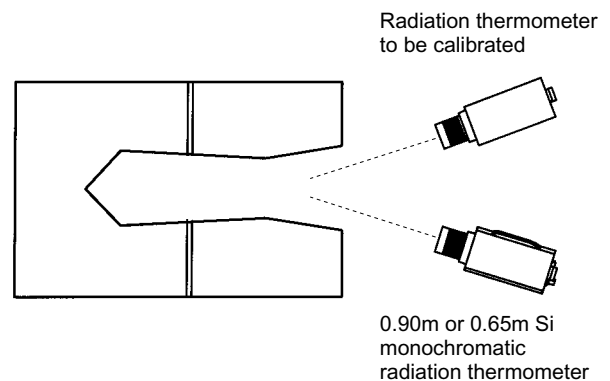


## CALIBRATION EXAMPLE

### Model IR-R24



### Model IR-R26 & IR-R27



## SPECIFICATIONS

### Black Body Furnace for High Temperature Range Model IR-R27

WORKING TEMPERATURE RANGE: 800 to 1450°C  
 MAXIMUM WORKING TEMPERATURE: 1500°C  
 MAXIMUM HEATING TEMPERATURE: About 2 hours  
 CAVITY PROFILE: Cylindrical cone type  
 VERTICAL ANGLE OF THE CAVITY BOTTOM: 120°C  
 OPENING DIAMETER OF CAVITY: 30mm  
 CAVITY MATERIAL: Silicon carbide  
 CAVITY EMISSIVITY: 0.99  
 TEMPERATURE STABILITY: ±0.5K/30min  
 HEATER MATERIAL: Silicon carbide  
 CONTROL THERMOMETER: 0.9μm Si monochromatic radiation thermometer

TEMPERATURE CONTROL SYSTEM: Current type PID system  
 POWER CONTROL DEVICE: Thyristor Regulator  
 POWER SUPPLY: 200V AC 1φ (contact CHINO for others)  
 MAXIMUM POWER CONSUMPTION: About 2500VA  
 GROSS WEIGHT: About 36kg  
 CABINET SURFACE TEMPERATURE: Lower than 55°C by air cooling  
 SAFETY MEASURES: Earth linkage, with breaker  
 EXTERNAL DIMENSIONS: 280W x 425H x 550D (mm)

● **Black Body Furnace for Medium Temperature Range  
Model IR-R26**

WORKING TEMPERATURE RANGE:  
200 to 1050°C

MAXIMUM WORKING TEMPERATURE:  
1100

MAXIMUM HEATING TIME:  
about 4 hours

CAVITY PROFILE: Double cone type

VERTICAL ANGLE OF THE CAVITY BOTTOM :  
120°

OPENING DIAMETER OF CAVITY:  
50mm

OPENING RATIO ( l / d ):6

CAVITY MATERIAL: Inconel

CAVITY EMISSIVITY: 0.997

TEMPERATURE STABILITY:  
±0.25K/30min

HEATER MATERIAL: Kantal A-1

CONTROL THERMOMETER:  
R thermocouple

TEMPERATURE CONTROL SYSTEM:  
SSR Drive pulse type PID system

POWER CONTROL DEVICE:  
SSR

POWER SUPPLY: 100V AC 1φ (Contact CHINO for others)

MAXIMUM POWER CONSUMPTION:  
About 1200VA

GROSS WEIGHT: About 32kg

CABINET SURFACE TEMPERATURE:  
Lower than 45° by air cooling

SAFETY MEASURES: Earth linkage with breaker

EXTERNAL DIMENSIONS:  
280w x 425H x 550D (mm)

● **Black Body Furnace for Low Temperature Range  
Model IR-R24**

WORKING TEMPERATURE RANGE:  
50 to 450°C

MAXIMUM WORKING TEMPERATURE:  
500°C

MAXIMUM HEATING TIME:  
About 2.0 hours

CAVITY PROFILE: Double cone type

VERTICAL ANGLE OF THE CAVITY BOTTOM:  
120°

OPENING DIAMETER OF CAVITY:  
60mm

OPENING RATIO ( l / d ): 5

CAVITY MATERIAL: Internal wall is treated with Cu

CAVITY EMISSIVITY: 0.993

TEMPERATURE STABILITY:  
±0.15k/30min

HEATER MATERIAL: Kantal A-1

CONTROL THERMOMETER:  
Pt resistance thermometer

TEMPERATURE CONTROL SYSTEM:  
SSR Drive pulse type PID system

POWER CONTROL DEVICE:  
SSR

POWER SUPPLY: 100V AC 1φ (Contact CHINO for others)

MAXIMUM POWER CONSUMPTION:  
About 500VA

GROSS WEIGHT: About 30kg

CABINET SURFACE TEMPERATURE:  
Lower than 45° by air cooling

SAFETY MEASURES: Earth linkage

EXTERNAL DIMENSIONS:  
280w x 425H x 550D (mm)

● **Options For IR-R24**

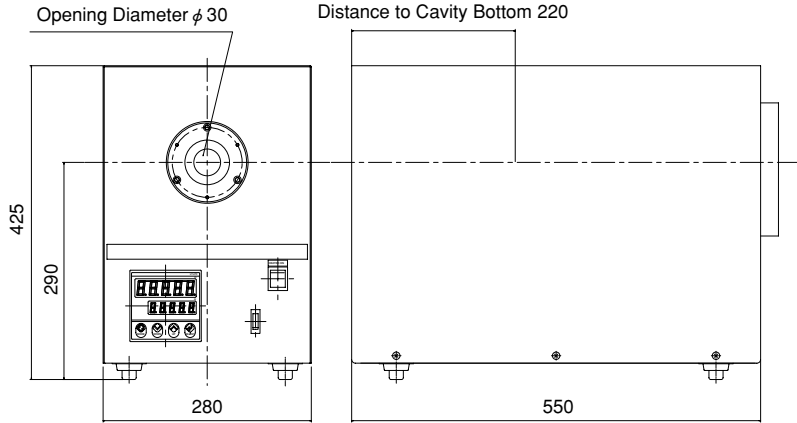
STANDARD PLATINUM RESISTANCE THERMOMETER  
FOR MEASURING CAVITY STANDARD TEMPERATURE:  
MODEL: NRHS1-0  
φ3.2mm x500mm, JIS CLASS A

FIXED POINT CALIBRATION (CHINO STANDARD) FOR  
NRHS1-0: MODEL: F-1C

PRECISION THERMOMETER:  
MODEL: CAB-F201

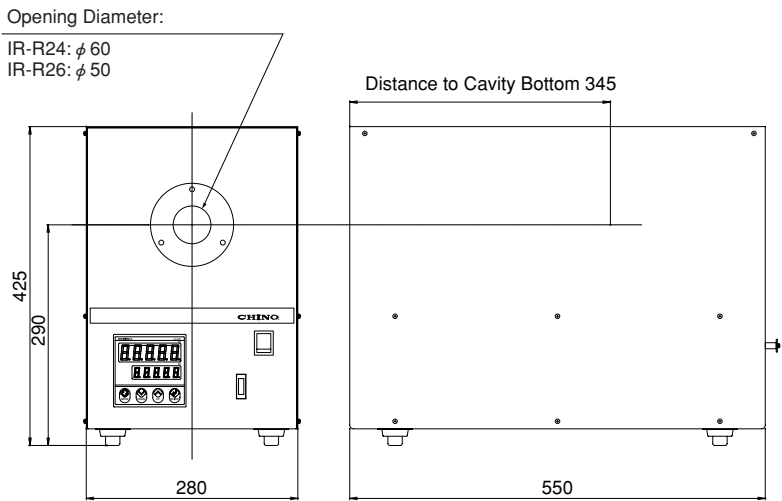
**EXTERNAL DIMENSIONS**

● **Model IR-R27**



● **Model IR-R26**

● **Model IR-R24**



Unit:mm

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