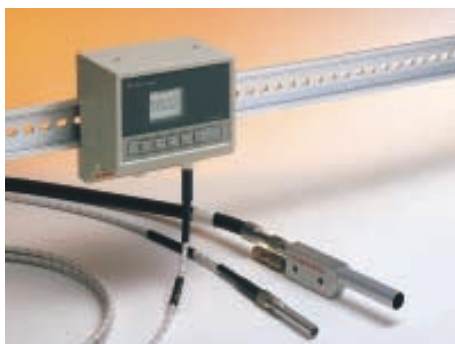
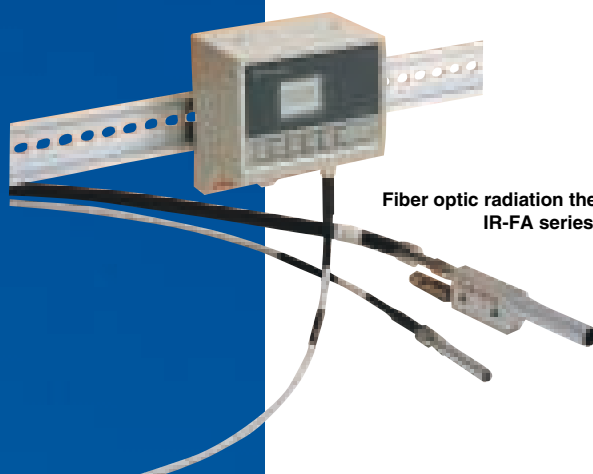


# INFRARED RADIATION THERMOMETERS







Fiber optic radiation thermometers  
IR-FA series



High-speed compact radiation thermometers  
IR-BHT series



Radiation thermometers  
IRC series



Digital radiation thermometers  
IRA series



# IR series infrared radiation thermometers in a wide range of industrial applications



Handheld type radiation thermometers  
IR-TA series



Handheld type radiation thermometers  
IR-H series

## Calibration service

CHINO is an accredited calibration laboratory for radiation thermometers under Japan Calibration Service System (JCSS) by Measurement Law and can issue calibration certificates with JCSS logo mark.

### Calibration test with JCSS logo mark

Calibration articles		Test items
0.9 μm	Fixed point	4 points of zinc, aluminum, silver and copper
Single-color radiation thermometer	calibration	3 points of aluminum, silver and copper
Other radiation thermometers	Comparison	400℃ or higher, 1500℃ or lower
(Except optical pyrometer)	calibration	1500℃ or higher, 2000℃ or lower

In addition to the calibration test, CHINO is offering standard radiation thermometers, fixed point black body furnaces, and comparison black body furnaces.



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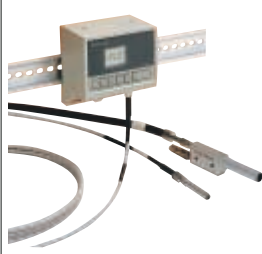
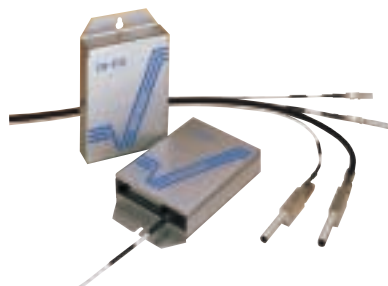
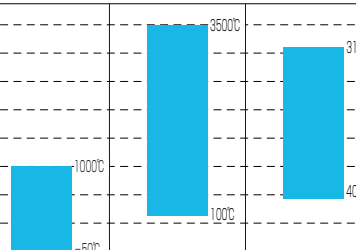
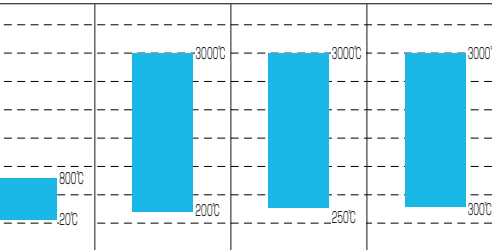
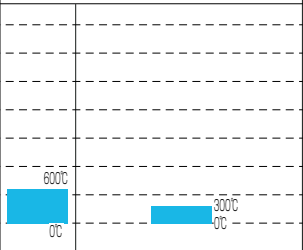
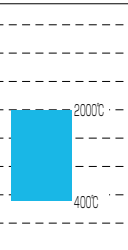
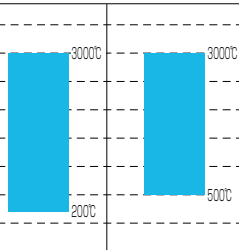
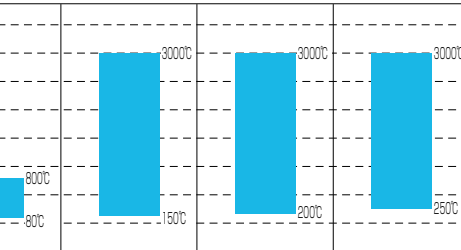
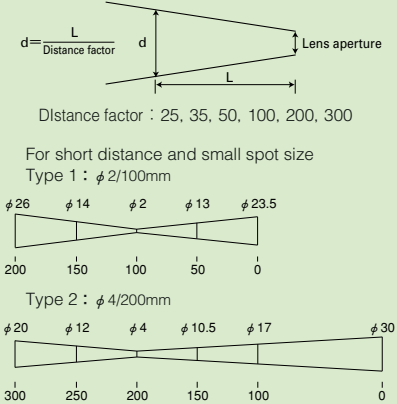
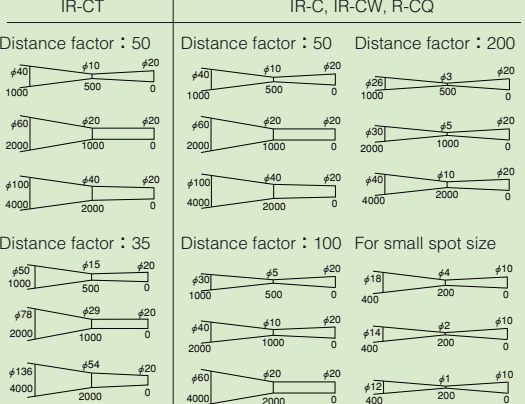
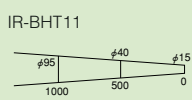
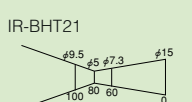
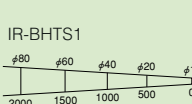
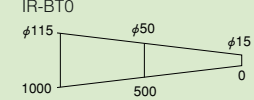
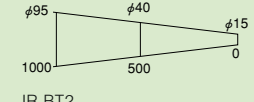
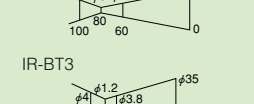
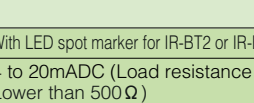
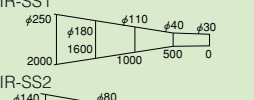
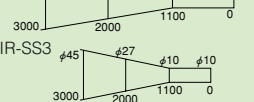
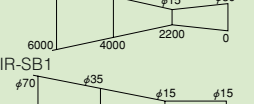
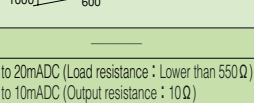
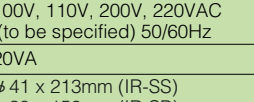
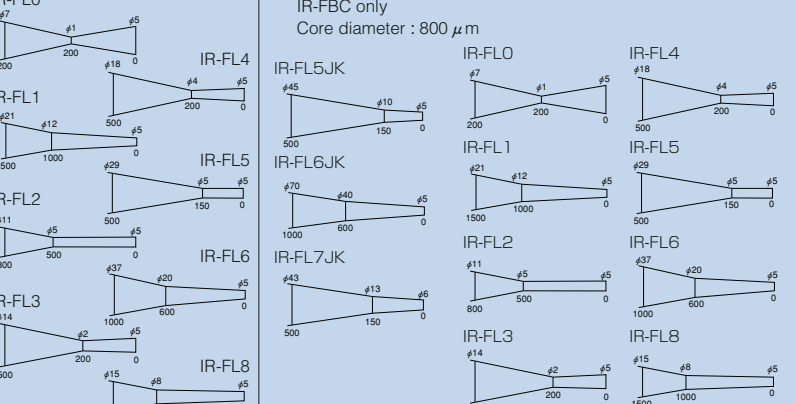

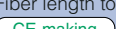
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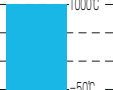
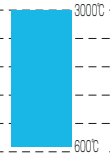


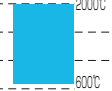
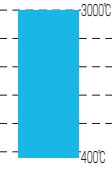


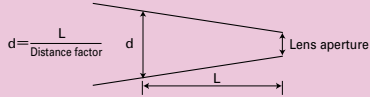
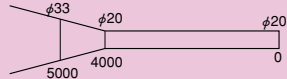
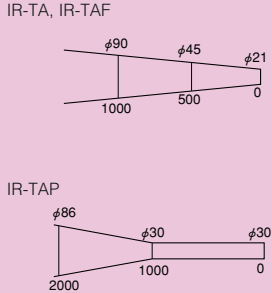


Models		Lens type												Fiber optic type									
		Digital infrared radiation thermometers			Infrared radiation thermometers				High-speed compact radiation thermometers	Compact radiation thermometers			Radiation thermometers		Fiber optic radiation thermometers	Fiber optic radiation thermometers							
		IR-A			IR-C				IR-BHT	IR-B			IR-S		IR-FA		IR-FB						
		Low temp	Medium/high temp	Two-color	Low temp	Single-color	Single color wide-range	Two-color		General type (Low/medium temp)	General type (Low temp)	Small spot size	Universal type	Standard type	Small type	Medium/high temp	Two-color	Low temp	Medium/high temp	Wide-range	Two-color		
		IR-AL	IR-AP	IR-AQ	IR-CT	IR-C	IR-CW	IR-CQ		IR-BT1	IR-BT2	IR-BT3	IR-BT0	IR-SS	IR-SB	IR-FA	IR-FAQ	IR-FBC	IR-FB	IR-FBW	IR-FBQ		
Appearance		Focusable Type																					
																							
Temperature range		3500℃ 3000℃ 2500℃ 2000℃ 1500℃ 1000℃ 500℃ 0℃ -50℃																					
Element Spectral response		Pyroelectric 8 to 13 μm	PbSe 4 μm PbS 2 μm Ge 1.6 μm Si 0.96 μm	Ge 1.5/1.65 μm Si 0.8/0.97 μm	Thermopile 8 to 13 μm	InGaAs 1.55 μm Si 0.9 μm	InGaAs 1.35/1.55 μm Si 0.85/1 μm Si/InGaAs 0.9/1.5 μm	Thermopile 8 to 13 μm	Thermopile 8 to 13 μm			Thermopile 8 to 13 μm		Si 0.9 μm		InGaAs 1.55 μm Si 0.9 μm	Si/InGaAs 0.9/1.55 μm	Cooling type PbS 2.0 μm	InGaAs 1.55 μm Si 0.9 μm	InGaAs/InGaAs 1.55/1.55 μm Si/InGaAs 0.9/1.55 μm	InGaAs 1.35/1.55 μm Si 0.85/1.0 μm		
Response time (95% response)		0.5s	0.2s	0.3s	0.2s	10ms 0.5ms (high-speed type)	10ms 2ms (high-speed type)	20ms 0.5ms (high-speed type)	Shorter than 0.1s, Shorter than 0.2s (small spot size type or long distance type) 50ms (high-speed type)			Shorter than 1s, Shorter than 0.7s (small spot size)		Shorter than 1ms		20ms	30ms	0.5s	10ms 0.5ms (high-speed type)	20ms 2ms (high-speed type)	20ms 0.5ms (high-speed type)		
Signal processing (converter)		REAL, PEAK, DELAY, VALLEY DELAY only (back-of-panel type converter)			PEAK, DELAY				—			—		REAL, PEAK, DELAY, VALLEY REAL only (back-of-panel type converter)		REAL, PEAK, DELAY		REAL, PEAK, DELAY					
Measuring distance		Min. 0.5m (Min. 100mm for IR-AP and min. 190mm for IR-AL by using a close-up lens)			Refer to the followings. Min. 0.5m for focusable type				Refer to the followings.			Refer to the followings.		Refer to the followings.		Refer to the followings.		Refer to the followings.		Refer to the followings.			
Spot size/ Measuring distance (mm)									  			   			    								
Targeting		Through-the-lens sighting or laser targeting			Through-the-lens sighting or laser targeting				—			With LED spot marker for IR-BT2 or IR-BT3		—		Laser targeting (option)		—					
Output signal*		4 to 20mADC (Load resistance : Lower than 550 Ω) 0 to 10mADC (Output resistance : 10 Ω)			4 to 20mADC (Load resistance : 550 Ω)				4 to 20mADC (Load resistance : Lower than 280 Ω)			4 to 20mADC (Load resistance : Lower than 500 Ω)		4 to 20mADC (Load resistance : Lower than 550 Ω) 0 to 10mADC (Output resistance : 10 Ω)		4 to 20mADC (Load resistance : Lower than 550 Ω)		4 to 20mADC (Load resistance : Lower than 500 Ω) mVDC/℃ (Load resistance : Higher than 5k Ω)					
Communications interface*		RS-232C or RS-422A (Multi-function panel-mount type converter only)			—				—			—		—		—		—					
Power supply		100V, 110V, 200V, 220VAC (to be specified) 50/60Hz			24VDC				12 to 24VDC			85 to 264VAC, 50/60Hz		100V, 110V, 200V, 220VAC (to be specified) 50/60Hz		24VDC		85 to 132VAC or 175 to 264VAC (to be specified), 50/60Hz 85 to 264VAC, 50/60Hz (IR-FBC)					
Power consumption		30VA (40VA for multi-function panel-mount converter)			3VA				Current consumption: Lower than 60mA			9VA		20VA		3VA		25VA 4VA 6VA 6VA					
Dimensions		W130 x H89 x D130mm			W66 x H110 x D190mm				W100 x H56 x D32mm			W100 x H56 x D32mm W140 x H68 x D68mm (IR-BT3)		φ 41 x 213mm (IR-SS) φ 30 x 150mm (IR-SB)		W90 x H90 x D60mm (thermometer)		W116 x H210 x D70mm (IR-FBC, IR-FBW) W116 x H210 x D40mm (IR-FB, IR-FBQ)					
Weight		1.9kg			1kg				220g			220g, 400g (IR-BT3)		1.1kg (IR-SS), 280g (IR-SB)		250g		1.6kg 1kg 1.2kg 1.1kg					
Others		—			—  (option) —				—			—		—		Fiber length to be specified 		Fiber length to be specified					
Page		4			10				20			22		24		14		16					





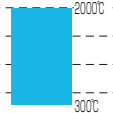


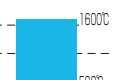
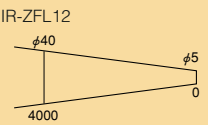
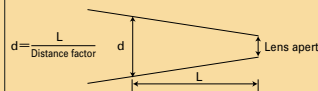
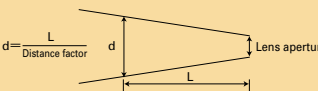
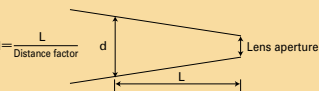
\* Including output from converter

CE-making : conforming to CE-marking



Handheld type								
Handheld type digital radiation thermometers			Handheld type radiation thermometers			Handheld type radiation thermometers		
IR-AH			IR-H			IR-TA		
Low temp	Medium/high temp	High temp	Single-color medium/high temp	Single-color high temp	High-function (2-color + Single-color wide)	Universal	Standard	With memory
IR-AHT	IR-AHS	IR-AHU	IR-HI	IR-HS	IR-HQH	IR-TAF	IR-TA	IR-TAP
Focusable Type								
								
								
Thermopile 8 to 13 $\mu\text{m}$	Si 0.95 $\mu\text{m}$	Si 0.65 $\mu\text{m}$	InGaAs 1.55 $\mu\text{m}$	Si 0.9 $\mu\text{m}$	Si/InGaAs 0.9/1.55 $\mu\text{m}$	Thermopile 8 to 14 $\mu\text{m}$		
1s	0.5s	0.5s	0.2s			0.8s		
REAL, PEAK, DELAY, VALLEY			PEAK, DELAY			—		
Min. 0.7m Distance factor 40	Min. 0.5m Distance factor 100 (Min. 100mm by a close-up lens)	Min. 0.5m Distance factor 250 (Min. 160mm by a close-up lens)	Refer to the followings.			Refer to the followings.		
 <p>Distance factor : IR-AHT 40 IR-AHS 100 IR-AHU 250</p>								
Through-the-lens sighting			Through-the-lens			Laser targeting (IR-TA, IR-TAP)		
0 to 1VDC (option)			—			—		
RS-232C			RS-232C			—		
AA 4 pieces AC adapter (Separate order)			AA 2 pieces AC adapter (Separate order)			AA 2 pieces		
20 hours continuous running			20 hours continuous running			50 hours continuous running		
W175 x H135 x D60mm			W148 x H100 x D70mm			W81 x H142 x D33mm (IR-TAF, IR-TA) W92 x H150 x D44mm (IR-TAP)		
850g (IR-AHT), 700g (IR-AHS, IR-AHU)			350g			160g	180g	220g
Data processing software package IR-VXH2 (Separate order)			Data processing software package IR-VXG1 (Separate order), CE-making			Data processing software package (IR-TAP, separate order), CE-making (IR-TA only)		
29			30			31		

Data processing software package : Data processing software package available

Scanning type			
Fiber optic scanning radiation thermometers	Scanning radiation thermometers for low temperature	Scanning radiation thermometers	Scanning radiation thermometers
IR-ES	IR-ESC	IR-E	IR-N
			
			
InGaAs 1.55 $\mu\text{m}$ Si 0.95 $\mu\text{m}$	Cooling type PbSe	Cooling type PbSe 4.0 $\mu\text{m}$	CCD silicon linear array 0.9 $\mu\text{m}$
Scanning speed : 5 times/s	0.5ms Scanning speed : 5 times/s or 10 times/s	5, 10, 30, 50 times/s	90 times/s
Thermal image processing by a display processing unit	Thermal image processing by a display processing unit	Thermal image processing by a display processing unit	Thermal image processing by a display processing unit
Refer to the followings.	Min. 0.5m	0.5 to 10m	1 to 10m
 <p>Scanning angle : 90°</p>	 <p>Distance factor : 150 Scanning angle : 90°</p>	 <p>Distance factor : 50 (50×50) 100 (100×100) Scanning angle : 50°</p>	 <p>Scanning angle : 50°, 25°, 7°</p>
—	Through-the-lens sighting or laser targeting (option)	—	Through-the-lens sighting
0 to 5VDC (Display processing unit)	0 to 5VDC (Display processing unit)	0 to 5VDC (Display processing unit)	0 to 5VDC (Display processing unit)
—	—	—	—
100 to 120VAC or 200 to 240VAC (to be specified), 50/60Hz	100 to 240VAC, 50/60Hz	100VAC, 50/60Hz	100VAC, 50/60Hz
—	40VA (Scanning unit)	40VA	30VA
Scanning unit W195 x H100 x D85mm	Scanning unit W339 x H211 x D125mm	W450 x H225 x D120mm	W345 x H82 x D130mm (IR-N07)
Scanning unit 1.3kg	Scanning unit 6.5kg	12kg	3kg
Data processing software package Display processing unit Fiber length to be specified	Data processing software package Display processing unit Kiln shell software package (Separate order)	Data processing software package Display processing unit	Data processing software package Display processing unit
32	33	34	36



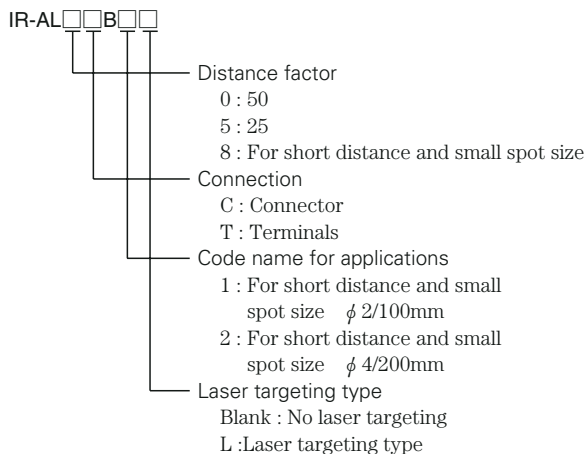
# DIGITAL INFRARED RADIATION THERMOMETERS

## Radiation thermometers for low temperature IR-AL



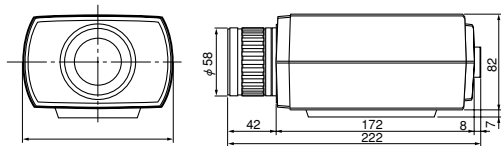
IR-AL series are wide-band radiation thermometers using a pyroelectric element for the measuring temperature of -50°C to 1000°C. By using focusable Cassegrain optics, it measures temperature of an object at any measuring distance.

### Model

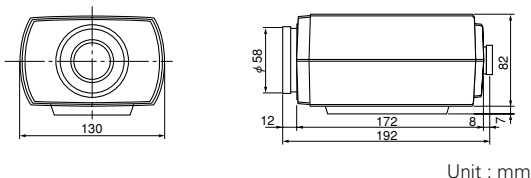


### Dimensions

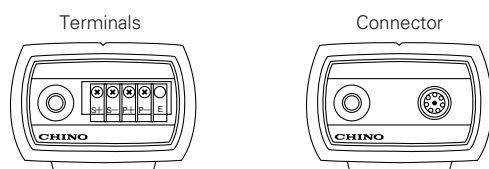
#### Standard type



#### For short distance and small spot size



### Terminal board



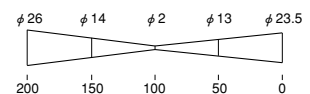
### General specifications

Measuring system : Wide-band radiation thermometer  
 Element : Pyroelectric  
 Spectral response : 8 to 13  $\mu$ m  
 Measuring range : -50 to 1000°C  
 Accuracy ratings : Lower than 200°C... $\pm 2^\circ\text{C}$   
                                  Higher than 200°C... $\pm 1.0\%$  of readings  
                                  (at  $\epsilon \approx 1.0$  and reference operating conditions)  
 Reproducibility : Within 1°C  
 Temperature drift : Lower than 300°C...0.15%/°C  
                                  300°C to 700°C...0.05% of readings/°C  
                                  Higher than 700°C...0.025% of readings/°C  
 Warm-up time : Within 15 minutes  
 Resolution : 1.0°C (higher than 50°C)  
 Response time : About 0.5s (95% response)...Converter output  
 Distance factor : 25 or 50  
 Measuring distance : 0.5m to infinity  
 Spot size : Measuring distance/distance factor  
 Lens aperture :  $\phi$  40mm  
 Targeting : Through-the-lens sighting  
 Working temperature : 0 to 50°C  
                                  0 to 150°C (using water-cooling by protective case IR-VHC)  
 Allowable vibration : Less than 29.4m/s<sup>2</sup> (3G)  
 Connection : Terminals or connector  
                          Terminals only for protective case IR-VCH  
 Cable length : Up to 200m (exclusive cable)  
 Housing : Die-cast aluminum  
 Mounting : On tripod, universal head or in protective case  
 Weight : About 1.9kg

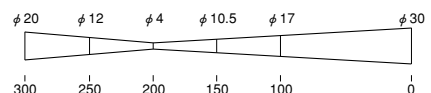
### Specifications for short distance and small spot size

Element : Pyroelectric  
 Spectral response : 8 to 13  $\mu$ m  
 Measuring range : -50 to 1000°C  
 Accuracy ratings : Lower than 200°C... $\pm 2^\circ\text{C}$   
                                  Higher than 200°C... $\pm 1.0\%$  of readings  
                                  (at  $\epsilon \approx 1.0$  and reference operating conditions)  
 Reproducibility : Within 1°C  
 Temperature drift : Lower than 300°C...0.15%/°C  
                                  300°C to 700°C...0.05% of readings/°C  
                                  Higher than 700°C...0.025% of readings/°C  
 Warm-up time : Within 15 minutes  
 Resolution : 1.5°C  
 Response time : About 1s (95% response)...Converter output  
 Spot size :  $\phi$  2/100mm or  $\phi$  4/200mm  
                          (Distance factor : 50, Fixed focus type)

#### Type 1 ( $\phi$ 2/100mm)



#### Type 2 ( $\phi$ 4/200mm)



Unit : mm

Lens aperture :  $\phi$  40mm  
 Targeting : Through-the-lens sighting  
 Working temperature : 0 to 50°C  
                                  0 to 150°C (using water-cooling by protective case IR-VCH)  
 Allowable vibration : Less than 29.4m/s<sup>2</sup> (3G)  
 Connection : Terminals or connector  
                          Terminals only for protective case IR-VCH  
 Cable length : Up to 200m (exclusive cable)  
 Housing : Die-cast aluminum  
 Mounting : On tripod, universal head or in protective case  
 Weight : About 1.9kg

### Standard temperature range

-50 to 1000°C

\* Reference operating condition : 23°C  $\pm$  5°C, 35 to 75%RH



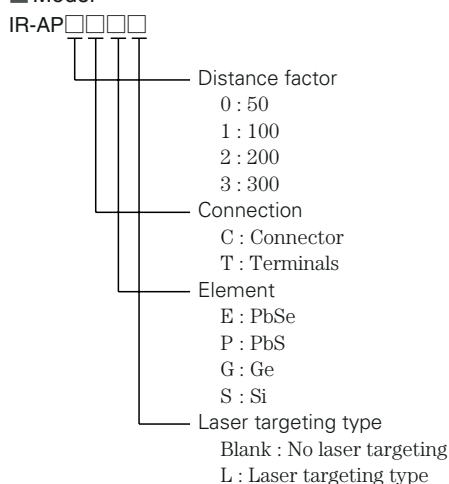
## Radiation thermometers for medium/high temperature

# IR-AP



IR-AP series are single-color narrow-band radiation thermometers using a PbSe, PbS, Ge or Si element for the measuring temperature of 100°C to 3500°C. It provides high precision temperature measurements at 4 kinds of wavelengths classified by temperature ranges.

### Model



### General specifications

Measuring system : Narrow-band radiation thermometer

Element : PbSe, PbS, Ge or Si

Spectral response : PbSe...4 μm

PbS...2 μm

Ge...1.6 μm

Si...0.96 μm

Measuring range : 100 to 3500°C

(Refer to the standard temperature range.)

Accuracy ratings : PbSe, PbS, Ge

Lower than 500°C...±3°C

500 to 1000°C...±5°C

Higher than 1000°C...±0.5% of readings

Si

Lower than 1500°C...±0.5% of readings

1500 to 2000°C...±1.0% of readings

Higher than 2000°C...±2.0% of readings

(at ε ≈ 1.0 and reference operating conditions)

Reproducibility : Within 1°C

Temperature drift : PbSe, PbS, Ge

Lower than 500°C...0.15°C/°C

500 to 1000°C...0.25°C/°C

Higher than 1000°C...0.025% of readings/°C

Si...0.015% of readings/°C

Warm-up time : PbSe, PbS...Within 15 minutes

Ge, Si...Within 1 minute

Resolution : PbSe, PbS

Lower than 300°C...2°C

Higher than 300°C...1°C

Ge, Si

Lower than 400°C...1.5°C

Higher than 400°C...1.0°C

Response time : About 0.2s (95% response)...Converter output

Distance factor : 50, 100, 200 or 300

Measuring distance : 0.5m to infinity

Spot size : Measuring distance/distance factor

Lens aperture : φ 30mm

Targeting : Through-the-lens sighting

Working temperature : 0 to 50°C

0 to 150°C (using water-cooling by protective case IR-VCH)

Allowable vibration : Less than 29.4m/s<sup>2</sup> (3G)

Connection : Terminals or connector

Terminals only for protective case IR-VCH

Cable length : Up to 200m (exclusive cable)

Housing : Die-cast aluminum

Mounting : On tripod, universal head or in protective case

Weight : About 1.9kg

### Standard temperature range

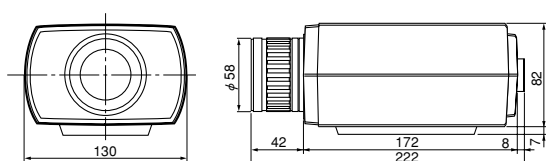
Element	PbSe	PbS	Ge	Si
Spectral response	4 μm	2 μm	1.6 μm	0.95 μm
Temperature range (Distance factor)	100~500°C (100)	150~450°C (100)	300~ 900°C (50)	500~1200°C (50)
	200~800°C (100)	200~600°C (100, 300)	400~1300°C (100)	600~3000°C (100, 200)
			500~1500°C (100, 300)	800~3500°C (100, 300)

### Close-up lens

Model	Measuring distance	Spot size
IR-VD12	100~120mm	φ 1~1.2mm
IR-VD15	115~150mm	φ 1.15~1.5mm
IR-VD20	145~200mm	φ 1.45~2mm
IR-VD30	190~300mm	φ 1.9~3mm
IR-VD60	270~600mm	φ 2.7~6mm

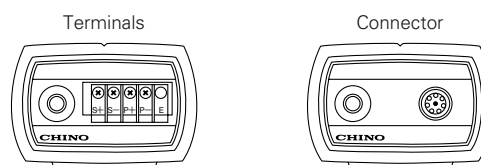
Note) The above table is for the distance factor of 100. For the distance factor of 200 or 300, the spot size is 1/2 or 1/3 respectively.

### Dimensions



Unit : mm

### Terminal board





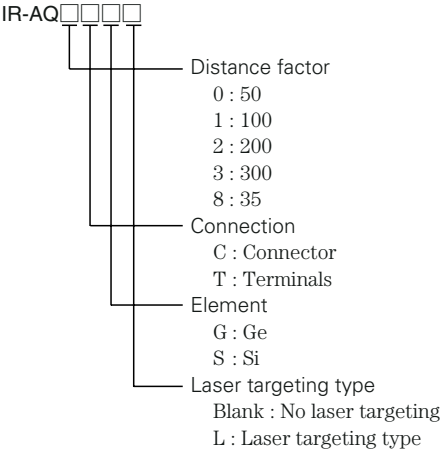
# DIGITAL INFRARED RADIATION THERMOMETERS

## Two-color radiation thermometers IR-AQ



IR-AQ series are two-color radiation thermometers for the measuring temperature of 400°C to 3100°C by the ratio of infrared energy at two wavelengths. The two-color thermometers are not easily affected by gray extinction principally. In addition to this feature, these thermometers have high reliability and performance by utilizing a digital ratio processing system and an interference film filter.

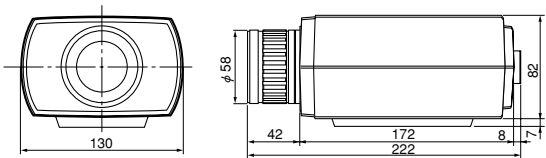
### Model



### Standard temperature range

Element	Ge	Si
Spectral response	1.5/1.65 $\mu$ m	0.8/0.97 $\mu$ m
Temperature range	400~1100°C (35)	700~1600°C (100)
(Distance factor)	500~1300°C (50)	800~1800°C (100, 200)
	600~1500°C (100)	1000~3100°C (200, 300)

### Dimensions



Unit : mm

### General specifications

Measuring system : Two-wavelength ratio processing system  
two-color radiation thermometer

Element : Ge or Si

Spectral response : Ge ...1.5/1.65  $\mu$  m  
Si...0.8/0.97  $\mu$  m

Measuring range : 400 to 3100°C  
(Refer to the standard temperature range.)

Accuracy ratings : 400 to 700°C... $\pm 1.0\%$  of readings  
700 to 1500°C... $\pm 0.5\%$  of readings  
1500 to 2000°C... $\pm 1.0\%$  of readings  
Higher than 2000°C... $\pm 2.0\%$  of readings  
(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : Within 1°C

Temperature drift : Ge  
Lower than 700°C...0.05% of readings/°C  
Higher than 700°C...0.025% of readings/°C  
Si...0.015% of readings/°C

Warm-up time : Within 1 minute

Resolution : 2°C

Response time : About 0.3s (95% response)...Converter output

Distance factor : 35, 50, 100, 200 or 300

Measuring distance : 0.5m to infinity

Spot size : Measuring distance/distance factor

Lens aperture :  $\phi$  30mm  
[  $\phi$  10mm mm for the distance factor of 200 at the temperature range of 1000 to 3100°C (Si)]

Targeting : Through-the-lens sighting

Working temperature : 0 to 50°C  
0 to 150°C (using water-cooling by protective case IR-VCH)

Allowable vibration : Less than 29.4m/s<sup>2</sup> (3G)

Connection : Terminals or connector  
Terminals only for protective case IR-VCH

Cable length : Up to 200m (exclusive cable)

Housing : Die-cast aluminum

Mounting : On tripod, universal head or in protective case

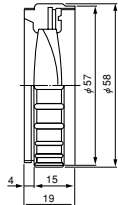
Weight : About 1.9kg

### Close-up lens

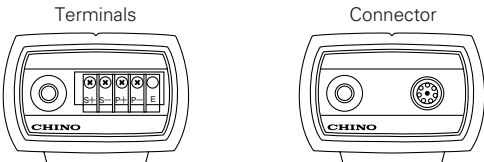
Model	Measuring distance	Spot size
IR-VD30	190~300mm	$\phi$ 1.9~3mm
IR-VD60	270~600mm	$\phi$ 2.7~6mm

Note) The above table is for the distance factor of 100. For the distance factor of 200 or 300, the spot size is 1/2 or 1/3 respectively.

### Close-up lens dimensions



### Terminal board





# Fiber optic two-color radiation thermometers

## IR-AQF



IR-AQF series are fiber optic two-color radiation thermometers for the measuring temperature of 500°C to 1800°C. The advantages of these fiber optic thermometers include the ability to reach into closed areas for viewing and to bend light path flexibly. They are used in environments with high humidity or containing smoke, or in the applications including induction heating, continuous casting, and pipe welding.

### Model

IR-AQF

Connection  
C : Connector  
T : Terminals  
Element  
G : Ge  
S : Si

### • Lens assembly

IR-VF

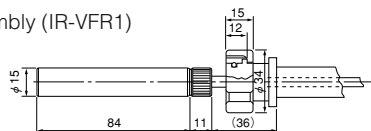
Spot size/measuring distance  
R1 :  $\phi$  4.6mm/140mm  
R2 :  $\phi$  15mm/500mm  
R3 :  $\phi$  15mm/500mm (with protective case)  
Fiber sheath  
H : Heat-resistive type  
L : Universal type  
Fiber length  
Length (m) to be specified

### Standard temperature range

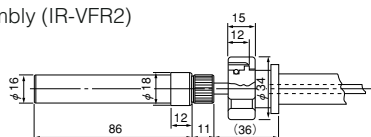
Element	Ge	Si
Spectral response	1.5/1.65 $\mu$ m	0.8/0.97 $\mu$ m
Temperature range	500~1300°C 600~1500°C	700~1600°C 800~1800°C

### Dimensions

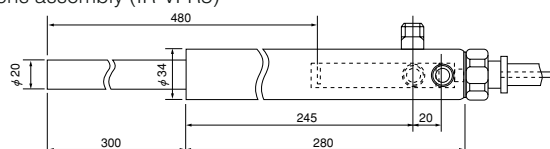
#### • Lens assembly (IR-VFR1)



#### • Lens assembly (IR-VFR2)



#### • Lens assembly (IR-VFR3)



Unit : mm

### General specifications

Measuring system : Two-wavelength ratio processing system  
two-color radiation thermometer

Element : Ge or Si

Spectral response : Ge...1.5/1.65  $\mu$ m  
Si...0.8/0.97  $\mu$ m

Measuring range : 500 to 1800°C  
(Refer to the standard temperature range.)

Accuracy ratings : 500 to 700°C... $\pm 1.0\%$  of readings  
700 to 1500°C... $\pm 0.5\%$  of readings  
Higher than 1500°C... $\pm 1.0\%$  of readings  
(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : Within 1°C

Temperature drift : Ge

Lower than 700°C...0.05% of readings/°C  
Higher than 700°C...0.025% of readings/°C  
Si...0.015% of readings/°C

Warm-up time : Within 1 minute

Resolution : 2°C

Response time : About 0.3s (95% response)...Converter output

Spot size : Refer to the spot size/measuring distance.

### • Fiber optics

Material : Quartz bundle fiber

Sheath : Heat-resistive type...

Teflon heat-resistive sheath + SUS flexible tube

Universal type...PVC sheath + SUS flexible tube

Working temperature : Heat-resistive type...Max 150°C

Universal type...Max 80°C

Length : 4m standard (up to 20m upon request)

Allowable bending radius : R800mm

### • Lens assembly

Light collection : Through lens

Connection : Connector

### Protective case specifications (IR-VCF)

Construction : With water-cooling and internal air purge function

Mounting : With angles

Weight : About 8kg

Cooling water : Flow...1 to 2  $\ell$  /min

Pressure...Within 300kPa

Connection...R1/2 (inlet and outlet)

Purge air : Air...Instrumentation air

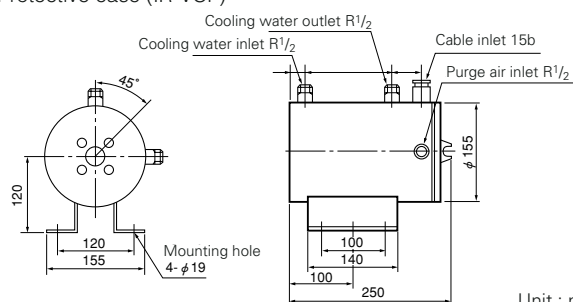
Pressure...Outside air pressure + 50Pa

Connection...R1/2

### Spot size/measuring distance

Model	Spot size/measuring distance (mm)
IR-VFR1	
IR-VFR2 IR-VFR3	

### • Protective case (IR-VCF)



Unit : mm



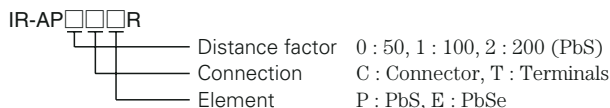
# DIGITAL INFRARED RADIATION THERMOMETERS

## Radiation thermometer for furnace inside temperature

This thermometer is for temperature measurements of materials in a combustion furnace or directly heated by a burner.

As its wavelength is  $2.2\mu\text{m}$  or  $3.8\mu\text{m}$ , the measurements is not easily affected by combustion gas.

### Model



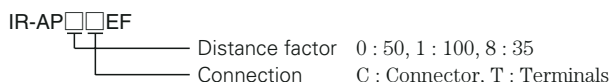
### Standard temperature range

Element	Measuring range (Distance factor)			
PbS	400~1200℃ (50)	500~1300℃ (50, 100)	600~1400℃ (50, 100, 200)	700~1500℃ (50, 100, 200)
PbSe	350~1100℃ (50)	450~1300℃ (50, 100)	500~1500℃ (50, 100)	

## Radiation thermometer for polyethylene film

This thermometer is for temperature measurements of polyethylene films. As its measuring wavelength is  $3.43\mu\text{m}$ , which is an absorption band of hydrocarbon being contained in polyethylene high molecules, it can measure the film temperature accurately without being affected by the film thickness, coloring agents, water vapor or carbon dioxide.

### Model



### Standard temperature range (Distance factor)

100~300℃ (35) , 200~500℃ (50, 100) , 300~800℃ (50, 100)

## Radiation thermometer for polyester film

This thermometer is for temperature measurements of polyester films. As its measuring wavelength is  $7.8$  to  $8.2\mu\text{m}$ , which is an absorption band of polyester high molecules, it can measure the film temperature accurately without being easily affected by water vapor or carbon dioxide.

### Model



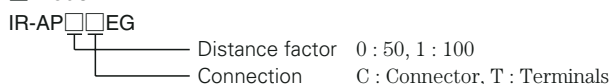
### Standard temperature range

0~400℃ 100~600℃

## Radiation thermometer for depositing glass heated by a burner

This thermometer is for temperature measurements of depositing glasses. As its wavelength is  $3.8\mu\text{m}$ , where the emissivity of glass is high and stable when the glass thickness is kept constant, it can accurately measure the depositing glass temperature without being affected by a burner.

### Model



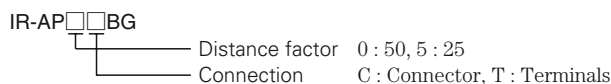
### Standard temperature range (Distance factor)

350~1100℃ (50) , 400~1200℃ (50) , 450~1300℃ (100)  
500~1500℃ (100)

## Radiation thermometer for glass

The thermometer is for temperature measurements of glasses. As its wavelength is  $5.0\mu\text{m}$ , where the transparent ratio of the glass is little and is not easily affected by the influence by vapor or carbon dioxide, it can accurately measure the glass temperature without being affected the transparency or reflection of the glass.

### Model



### Standard temperature range (Distance factor)

100~800℃ (25) , 200~1800℃ (50) , 400~2800℃ (50)

## Radiation thermometer for flame

The flame temperature is regarded to be equal to the carbon dioxide ( $\text{CO}_2$ ) temperature when the combustion gas is  $\text{CO}_2$  in a complete combustion flame. The  $\text{CO}_2$  has its absorption band at  $4.5\mu\text{m}$ . When the thickness of  $\text{CO}_2$  is more than 500mm, its temperature can be measured. This thermometer measures the flame temperature by measuring the  $\text{CO}_2$  temperature in the flame.

### Model



### Standard temperature range

800~1400℃ 900~2000℃ 1000~2400℃

## Two-color thermometer for aluminum

A long wavelength is used for the temperature measurements of aluminum that has low radiation energy at the low/medium temperature band. This thermometer uses a PbS element with the wavelength of  $2.05/2.35\mu\text{m}$  for the accurate temperature measurements of aluminum in the low/medium temperature band ( $200^\circ\text{C}$  to  $500^\circ\text{C}$ ).

### Model



### Standard temperature range

200~400℃ 250~450℃ 300~500℃

## Radiation thermometer for silicon wafers

### IR-AP0CSC

The wavelength of this thermometer is  $0.6\mu\text{m}$  to  $0.96\mu\text{m}$ . By utilizing non-transparent band of silicon wafers, the high spectral emissivity can be got. This thermometer can accurately measure the wafer temperature without being affected by a burner at the rear side of the wafer.

### Standard temperature range

400~800℃ 500~1000℃ 600~1200℃

## Radiation thermometer for gallium arsenic

### IR-AP0CSG

The wavelength of this thermometer is  $0.6\mu\text{m}$  to  $0.9\mu\text{m}$ . By utilizing non-transparent band of GaAs wafers, the high spectral emissivity can be got. This thermometer can accurately measure the wafer temperature.

### Standard temperature range

400~700℃ 450~800℃ 500~900℃



## Converters for IR-A series

# IR-GA

IR-GA series are converters that receive temperature signal from radiation thermometers and output specific signals after emissivity (ratio) compensation, linearization, and signal modulation.

### Model

IR-GA

Model

B : Back-of-panel type (without monitor)

P : Panel-mount type

W : Wall-mount type

G : Multi-function panel mount type

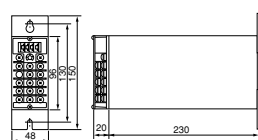


### General specifications

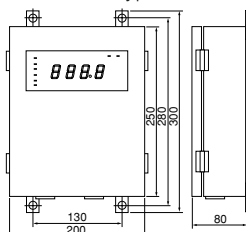
Model		Back-of-panel type (IR-GAB)	Panel-mount type (IR-GAP) / Wall-mount type (IR-GAW)	Multi-function panel-mount type (IR-GAG)
Emissivity compensation (Emissivity ratio compensation)		1.000~0.100 (1.200~0.800)		
Modulator	Modulation	DELAY···Tracing of average value (smoothing)	REAL···Original signal PEAK···Tracing of max value	DELAY···Tracing of average value (smoothing) VALLEY···Tracing of min value
	Degree	0 to 99s (63%)	0 to 99s (63%)    0 to 9.9s (0.1s inclement), 10 to 99s (1s inclement)	
	Hold	Output hold by remote contacts	Output hold by remote contacts (a contact)	
	Modulation cancellation	———	Shifts to real by remote contacts (a contact)	
Display		———	LED 4-digit (red) Measured temp or parameters selective display Character height : 15mm (25mm for wall-mount type)	LED 4-digit (red) Selective display for parameters Character height : 10mm
Output signal		4 to 20mADC (allowable load resistance : lower than 550 Ω) 0 to 10mVDC (output resistance : 10 Ω) Isolated output	4 to 20mADC (allowable load resistance : lower than 550 Ω) 0 to 10mVDC (output resistance : 10 Ω) Independent isolated output	
Output scaling		Depended on standard temperature range (special scaling available)	Optional setting at zero and span (1℃ increment)	
Output renewal cycle		0.1s		
Accuracy ratings	Display	———	±0.1% of readings ± 1 digit	
	Analog output	±0.2% of thermometer's measuring range		
Alarm output		———	High/low independent alarm setting Setting range···Full range    Output terminal···2 sets of H, C and L terminals Contact rating···100V 1A (resistive load)    Judgement···Before modulator	
Self diagnosis		Cable disconnection, communications abnormal, chopper motor rotation abnormal, thermometer temperature abnormal Contact output 1 point (ON at normal condition), with LED display		
Weight		About 2kg	Panel-mount type···about 2.5kg Wall-mount type···about 6kg	About 4kg
Power supply		100, 110, 200, 220VAC (to be specified), 50/60Hz		
Allowable voltage fluctuation		90 to 110% of rated value		
Power consumption		About 30VA (including thermometer)		About 40VA (including thermometer)
Working temperature		0 to 50℃		
Processing function		———	———	1. Section processing 2. Emissivity (ratio) program 3. Reflection correction 4. 2-input selection 5. Emissivity calibration
Options		———	———	Communications function RS-232C or RS-422A (to be specified)

### Dimensions

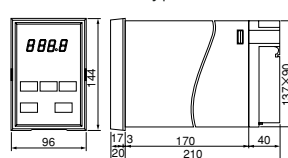
#### Back-of-panel type IR-GAB



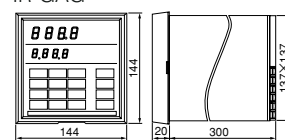
#### Wall-mount type IR-GAW



#### Panel-mount type IR-GAP



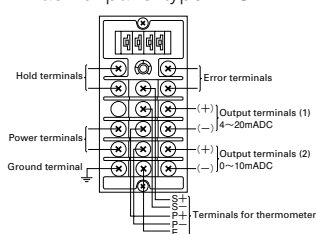
#### Multi-function panel-mount type IR-GAG



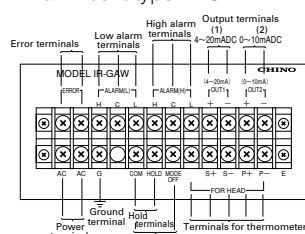
Unit : mm

### Terminal board

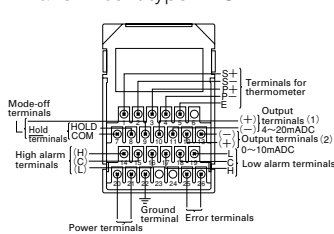
#### Back-of-panel type IR-GAB



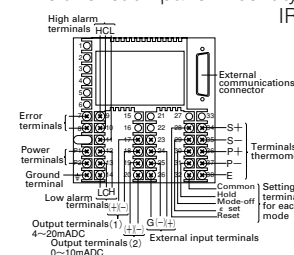
#### Wall-mount type IR-GAW



#### Panel-mount type IR-GAP



#### Multi-function panel-mount type IR-GAG





# INFRARED RADIATION THERMOMETERS

## Single-color radiation thermometers IR-C



IR-C series compact radiation thermometers having the through-the-lens sighting and easy-to-use features offer high precision of measurements and high speed of response.

These single-color narrow-band radiation thermometers use an InGaAs or Si element, and cover the wide measuring temperature of 200°C to 3000°C.

### Model

IR-C	Element	Fixed focus type spot size/measuring distance	Targeting /connection	Options
	I : InGaAs S : Si	00 : $\phi$ 10/500mm 20 : $\phi$ 3/500mm 01 : $\phi$ 20/1000mm 21 : $\phi$ 5/1000mm 02 : $\phi$ 40/2000mm 22 : $\phi$ 10/2000mm 10 : $\phi$ 5/500mm Small spot size type 11 : $\phi$ 10/1000mm 0S $\phi$ 4/200mm 12 : $\phi$ 20/2000mm 1S $\phi$ 2/200mm 2S : $\phi$ 1/200mm	OK : 50 1K : 100 2K : 200 A : Laser targeting/connector B : Laser targeting/terminals C : Through-the-lens sighting/connector T : Through-the-lens sighting/terminals	Blank : None A : High-speed B : Isolated output (4 to 20mADC linear output only) C : High-speed + isolated output D : Emissivity remote setting (4 to 20mADC input) E : High-speed + emissivity remote setting F : Emissivity remote setting + isolated output G : High-speed + emissivity remote setting + isolated output H : HMD output (open collector) I : High-speed + HMD output J : HMD output + isolated output K : High-speed + HMD output + isolated output L : Non-linear output (0 to 10mVDC) M : High-speed + non-linear output V : CE-marking (option) X : Other optional specifications Y : High-speed + other optional specifications

\* For the emissivity remote setting combined with the indicator with power supply, select the option combined with the isolated output (F or G).

\* For the CE-marking, the thermometer with through-the-lens sighting/connector (C), isolated output (B) and 24VDC is only available.

\* For the focusable type, the laser targeting type and CE-marking are not available.

### Standard temperature range

Model	Element	
	InGaAs	Si
IR-C□0□□□	200~450°C* 350~900°C 250~600°C* 400~1100°C 300~750°C 500~1300°C	500~900°C* 800~1600°C 600~1100°C* 900~2000°C 700~1300°C 1100~3000°C
IR-C□1□□□	250~600°C* 400~1100°C 300~750°C* 500~1300°C 350~900°C	600~1100°C* 900~2000°C 700~1300°C* 1100~3000°C 800~1600°C
IR-C□2□□□	300~750°C* 400~1100°C 350~900°C* 500~1300°C	700~1300°C* 900~2000°C 800~1600°C* 1100~3000°C

\* The small spot size type and the high-speed type are not available.

☆ The high-speed type in the small spot size type is not available.

### General specifications

Measuring system : Narrow-band radiation thermometer

Element : InGaAs or Si

Spectral response : InGaAs...1.55  $\mu$ m Si...0.9  $\mu$ m

Measuring range : 200 to 3000°C

(Refer to the standard temperature range.)

Accuracy ratings : Lower than 800°C... $\pm 4^\circ\text{C}$

800 to 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

Higher than 2000°C... $\pm 2.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : Within  $\pm 0.2^\circ\text{C}$

Temperature drift :  $0.1^\circ\text{C}/^\circ\text{C}$  or  $0.015\%$  of readings/ $^\circ\text{C}$ , whichever is larger

Resolution :  $0.2^\circ\text{C}$ ,  $0.5^\circ\text{C}$  for high-speed type

Response time : 10ms, 0.5ms for high-speed type (95% response)

Emissivity compensation : 1.99 to 0.10 (digital switch setting)

Modulator : Peak, delay selection

Modulation degree...Time constant 0, 1, 2, 5, 10, 20s

6-step selection (Time constant 0 : real output)

Output : 4 to 20mADC (linear, load resistance : 550  $\Omega$ )

Optical system : Lens, fixed focus type or focusable type

Spot size : Fixed focus type...Refer to the spot size/measuring distance.

Focusable type...Measuring distance/distance factor

Lens aperture :  $\phi$  20mm ( $\phi$  10mm for small spot size type)

Targeting : Through-the-lens sighting or laser targeting

Working temperature : 0 to 50°C

Working humidity : Lower than 90%RH (no dew condensation)

Power supply : 24VDC (22 to 28VDC)

Power consumption : About 3VA

Connection : Terminals or connector

Housing : Die-cast aluminum

Weight : About 1kg

CE-marking (option) : EN55011 Group 1 Class A EN50082-2

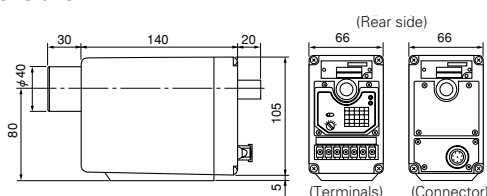
### Spot size/measuring distance

Model	Spot size/measuring distance (mm)
IR-C□00□□	$\phi$ 10/500mm
IR-C□01□□	$\phi$ 20/1000mm
IR-C□02□□	$\phi$ 40/2000mm
IR-C□10□□	$\phi$ 5/500mm
IR-C□11□□	$\phi$ 10/1000mm
IR-C□12□□	$\phi$ 20/2000mm
IR-C□20□□	$\phi$ 3/500mm
IR-C□21□□	$\phi$ 5/1000mm
IR-C□22□□	$\phi$ 10/2000mm

### Small spot size type

IR-C□0S□□	$\phi$ 4/200mm
IR-C□1S□□	$\phi$ 2/200mm
IR-C□2S□□	$\phi$ 1/200mm

### Dimensions



Unit : mm



# Single-color wide-range radiation thermometers

## IR-CW



IR-CW series are single-color narrow-band radiation thermometers using an InGaAs or Si element, and measure the wide temperature by a single unit.

### Model

IR-CW					
Element					
I : InGaAs S : Si					
Fixed focus type					
Spot size/measuring distance					
00 : $\phi$ 10/500mm 20 : $\phi$ 3/500mm					
01 : $\phi$ 20/1000mm 21 : $\phi$ 5/1000mm					
02 : $\phi$ 40/2000mm 22 : $\phi$ 10/2000mm					
10 : $\phi$ 5/500mm Small spot size type					
11 : $\phi$ 10/1000mm 0S : $\phi$ 4/200mm					
12 : $\phi$ 20/2000mm 1S : $\phi$ 2/200mm					
Focusable type/Distance factor					
0K : 50 1K : 100 2K : 200					
Targeting/connection					
A : Laser targeting/connector					
B : Laser targeting/terminals					
C : Through-the-lens sighting/connector					
T : Through-the-lens sighting/terminals					
Options					
Blank : None A : High-speed					
B : Isolated output (4 to 20mADC linear output only)					
C : High-speed + isolated output					
D : Emissivity remote setting (4 to 20mADC input)					
E : High-speed + emissivity remote setting					
F : Emissivity remote setting + isolated output					
G : High-speed + emissivity remote setting + isolated output					
H : HMD output (open collector)					
I : High-speed + HMD output					
J : HMD output + isolated output					
K : High-speed + HMD output + isolated output					
V : CE-marking (option)					
X : Other optional specifications					
Y : High-speed + other optional specifications					

\* For the emissivity remote setting combined with the indicator with power supply, select the option combined with the isolated output (F or G).

\* For the CE-marking, the thermometer with through-the-lens sighting/connector (C), isolated output (B) and 24VDC is only available.

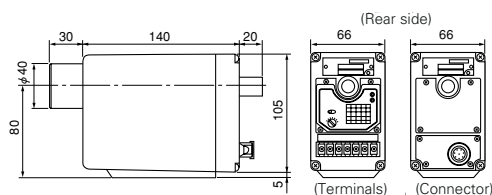
\* For the focusable type, the laser targeting type and CE-marking are not available.

### Standard temperature range

Model	Element	
	InGaAs	Si
IR-CW□0□□□	250~1000℃ * 350~1600℃ 300~1300℃	600~1800℃ * 800~3000℃ 700~2400℃
IR-CW□1□□□	300~1300℃ * 350~1600℃	700~2400℃ * 800~3000℃
IR-CW□2□□□	350~1600℃ *	800~3000℃ *

\* The small spot size type and the high-speed type are not available.

### Dimensions



Unit : mm

### General specifications

Measuring system : Narrow-band radiation thermometer

Element : InGaAs or Si

Spectral response : InGaAs...1.55  $\mu$ m Si...0.9  $\mu$ m

Measuring range : 250 to 3000℃

(Refer to the standard temperature range.)

Accuracy ratings : Lower than 1000℃... $\pm 5^\circ\text{C}$

1000 to 1500℃... $\pm 0.5\%$  of readings

1500 to 2000℃... $\pm 1.0\%$  of readings

Higher than 2000℃... $\pm 2.0\%$  of readings

(at  $\epsilon \div 1.0$  and reference operating conditions)

Reproducibility : Within  $\pm 0.2^\circ\text{C}$

Temperature drift : 0.1℃/℃ or 0.015% of readings/℃, whichever is larger

Resolution : 0.2℃, 0.5℃ for high-speed type

Response time : 10ms, 2ms for high-speed type (95% response)

Emissivity compensation : 1.99 to 0.10 (digital switch setting)

Modulator : Peak, delay selection

Modulation degree...Time constant 0, 1, 2, 5, 10, 20s

6-step selection (Time constant 0 : real output)

Output : 4 to 20mADC (linear, load resistance : 550  $\Omega$ )

Optical system : Lens, fixed focus type or focusable type

Spot size : Fixed focus type...Refer to the spot size/measuring distance.

Focusable type...Measuring distance/distance factor

Lens aperture :  $\phi$  20mm ( $\phi$  10mm for small spot size type)

Targeting : Through-the-lens sighting or laser targeting

Working temperature : 0 to 50℃

Working humidity : Lower than 90%RH (no dew condensation)

Power supply : 24VDC (22 to 28VDC)

Power consumption : About 3VA

Connection : Terminals or connector

Housing : Die-cast aluminum

Weight : About 1kg

CE-marking (option) : EN55011 Group 1 Class A EN5082-2

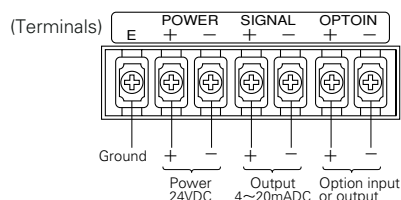
### Spot size/measuring distance

Model	Spot size/measuring distance (mm)	
IR-CW□00□□	$\phi$ 10/500mm	
IR-CW□01□□	$\phi$ 20/1000mm	
IR-CW□02□□	$\phi$ 40/2000mm	
IR-CW□10□□	$\phi$ 5/500mm	
IR-CW□11□□	$\phi$ 10/1000mm	
IR-CW□12□□	$\phi$ 20/2000mm	
IR-CW□20□□	$\phi$ 3/500mm	
IR-CW□21□□	$\phi$ 5/1000mm	
IR-CW□22□□	$\phi$ 10/2000mm	

### Small spot size type

IR-CW□0S□□	$\phi$ 4/200mm	
IR-CW□1S□□	$\phi$ 2/200mm	

### Terminal board





# INFRARED RADIATION THERMOMETERS

## Two-color radiation thermometers IR-CQ



IR-CQ series two-color radiation thermometers use 2-wavelength system not being affected by emissivity or gray extinction and cover the medium/high temperature of 300°C to 3000°C.

### Model

IR-CQ	Element	Fixed focus type	Spot size/measuring distance	Targeting/connection	Options
	I : InGaAs S : Si H : Si/InGaAs			A : Laser targeting/connector B : Laser targeting/terminals C : Through-the-lens sighting/connector T : Through-the-lens sighting/terminals	Blank : None A : High-speed B : Isolated output (4 to 20mADC linear output only) C : High-speed + isolated output D : Emissivity remote setting (4 to 20mADC input) E : High-speed + emissivity remote setting F : Emissivity remote setting+isolated output G : High-speed + emissivity remote setting + isolated output H : HMD output (open collector) I : High-speed + HMD output J : HMD output + isolated output X : Other optional specifications Y : High-speed + other optional specifications
			00 : $\phi$ 10/500mm 20 : $\phi$ 3/500mm 01 : $\phi$ 20/1000mm 21 : $\phi$ 5/1000mm 02 : $\phi$ 40/2000mm 22 : $\phi$ 10/2000mm 10 : $\phi$ 5/500mm Small spot size type 11 : $\phi$ 10/1000mm 0S : $\phi$ 4/200mm 12 : $\phi$ 20/2000mm 1S : $\phi$ 2/200mm 2S : $\phi$ 1/200mm		
			Focusable type/Distance factor 0K : 50 1K : 100 2K : 200		

\* For the emissivity remote setting combined with the indicator with power supply, select the option combined with the isolated output (F or G).

\* For the hybrid element (H) or the focusable type, the laser targeting type is not available.

### Standard temperature range

Model	Element		
	InGaAs	Si	Si/InGaAs
IR-CQ□0□□	300 ~ 650°C * 450 ~ 1100°C	700 ~ 1300°C *	900 ~ 2000°C
	350 ~ 800°C * 500 ~ 1300°C	800 ~ 1600°C *	1000 ~ 2500°C
	400 ~ 1000°C 600 ~ 1500°C	900 ~ 1800°C	1200 ~ 3000°C
IR-CQ□1□□	350 ~ 800°C * 500 ~ 1300°C	800 ~ 1600°C *	900 ~ 2000°C
	400 ~ 1000°C * 600 ~ 1500°C	900 ~ 1800°C *	1000 ~ 2500°C
	450 ~ 1100°C		1200 ~ 3000°C
IR-CQ□2□□	400 ~ 1000°C * 500 ~ 1300°C	900 ~ 1800°C *	900 ~ 2000°C
	450 ~ 1100°C * 600 ~ 1500°C		1000 ~ 2500°C
			1200 ~ 3000°C

\* The small spot size type and the high-speed type are not available.

☆ The high-speed type in the small spot size type is not available.

### General specifications

Measuring system : Two-wavelength ratio processing system  
two-color radiation thermometer

Element : InGaAs, Si or Si/InGaAs

Spectral response : InGaAs...1.35/1.55  $\mu$ m Si...0.85/1.00  $\mu$ m  
Si/InGaAs...0.9/1.5  $\mu$ m

Measuring range : 300 to 3000°C

(Refer to the standard temperature range.)

Accuracy ratings : Lower than 1000°C... $\pm 5^\circ\text{C}$

1000 to 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

Higher than 2000°C... $\pm 2.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : Within  $\pm 0.5^\circ\text{C}$

Temperature drift :  $0.2^\circ\text{C}/^\circ\text{C}$  or  $0.02\%$  of readings/ $^\circ\text{C}$ , whichever is larger

Resolution :  $0.5^\circ\text{C}$ ,  $1^\circ\text{C}$  for high-speed type

Response time : 20ms, 0.5ms for high-speed type (95% response)

Emissivity ratio compensation : 1.25 to 0.75 (digital switch setting)

Modulator : Peak, delay selection

Modulation degree...Time constant 0, 1, 2, 5, 10, 20s

6-step selection (Time constant 0 : real output)

Output : 4 to 20mADC (linear, load resistance : 550  $\Omega$ )

Optical system : Lens, fixed focus type or focusable type

Spot size : Fixed focus type...Refer to the spot size/measuring distance.

Focusable type...Measuring distance/distance factor

Lens aperture :  $\phi$  20mm ( $\phi$  10mm for small spot size type)

Targeting : Through-the-lens sighting or laser targeting

Working temperature : 0 to 50°C

Working humidity : Lower than 90%RH (no dew condensation)

Power supply : 24VDC (22 to 28VDC)

Power consumption : About 3VA

Connection : Terminals or connector

Housing : Die-cast aluminum

Weight : About 1kg

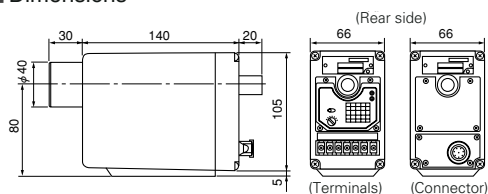
### Spot size/measuring distance

Model	Spot size/measuring distance (mm)	
IR-CQ□00□□	$\phi$ 10/500mm	
IR-CQ□01□□	$\phi$ 20/1000mm	
IR-CQ□02□□	$\phi$ 40/2000mm	
IR-CQ□10□□	$\phi$ 5/500mm	
IR-CQ□11□□	$\phi$ 10/1000mm	
IR-CQ□12□□	$\phi$ 20/2000mm	
IR-CQ□20□□	$\phi$ 3/500mm	
IR-CQ□21□□	$\phi$ 5/1000mm	
IR-CQ□22□□	$\phi$ 10/2000mm	

### Small spot size type

IR-CQ□0S□□	$\phi$ 4/200mm	
IR-CQ□1S□□	$\phi$ 2/200mm	
IR-CQ□2S□□	$\phi$ 1/200mm	

### Dimensions



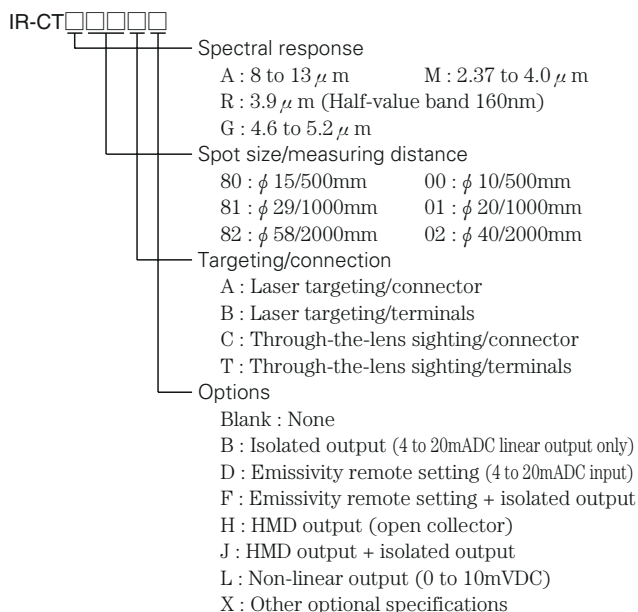
Unit : mm



## Radiation thermometers for low temperature IR-CT

In IR-CT series radiation thermometers, the low temperature radiation thermometers capable to measure from 20°C and application dedicated radiation thermometers are available.

### Model



\* For the emissivity remote setting combined with the indicator with power supply, select the option combined with the isolated output (F).

### Standard temperature range

Model	Object	Spectral response	Measuring range (Distance factor)
IR-CTA	For low temp	8~13 $\mu$ m	20~ 300°C (35) 20~ 800°C (35)* 80~ 300°C (50)
IR-CTM	Metal	2.37~4.0 $\mu$ m	100~ 350°C (35) 150~ 500°C (50)
IR-CTR	Material in furnace	3.9 $\mu$ m (Half-value band 160nm)	400~1300°C (35) 500~1500°C (50)
IR-CTG	Glass	4.6~5.2 $\mu$ m	100~ 600°C (35) 300~1000°C (50) 500~2000°C (50)

\* External linearization by the indicator with power supply IR-GC

### General specifications

Element : Thermopile

Accuracy ratings : Lower than 1000°C... $\pm 5^\circ\text{C}$

1000 to 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : Within  $\pm 0.5^\circ\text{C}$

Temperature drift : 0.2°C/°C or 0.02% of readings/°C, whichever is larger

Resolution : 1°C

Response time : 0.2s (95% response)

Emissivity compensation : 1.99 to 0.10 (digital switch setting)

Modulator : Peak, delay selection

Modulation degree...Time constant 0, 1, 2, 5, 10, 20s

6-step selection (Time constant 0 : real output)

Output : 4 to 20mADC (linear, load resistance : 550  $\Omega$ )

Optical system : Lens, fixed focus type

Lens aperture :  $\phi$  20mm

Targeting : Through-the-lens sighting

Working temperature : 5 to 45°C

Working humidity : Lower than 90%RH (no dew condensation)

Power supply : 24VDC (22 to 28VDC)

Power consumption : About 3VA

Connection : Terminals or connector

Housing : Die-cast aluminum

Weight : About 1kg

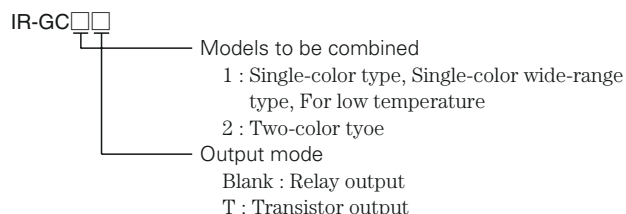
### Dimensions/terminal board

Refer to the single-color wide-range radiation thermometer IR-CW.

## Indicator with power supply IR-GC

IR-GC is designed to combine with IR-C series radiation thermometers and have the features of emissivity setting, measured value display and supplying power to the thermometer.

### Model



### General specifications

Emissivity setting : Single-color type...2.000 to 0.000

Two-color type...1.250 to 0.750

Key setting (0.001 increment)

Emissivity setting signal : 4 to 20mADC

Scaling : Key setting (setting to measuring range of thermometer)

Input signal : 4 to 20mADC (from thermometer)

Input sampling cycle : 8 to 206ms (selection from 9 kinds)

Modulator : Average...Tracing of section average value

· Section count value setting 1 to 9999 counts

· Data update cycle Input sampling time x counts

Hold...Output hold, sampling hold, peak hold and bottom hold by hold signal (external a contact)

Display : Data, mode, and alarm status (3 pieces of LED)

Analog output : 4 to 20mADC (load resistance : lower than 750  $\Omega$ )

Isolated output

Output update cycle : Display...0.1 to 25.5s

Analog output...16 to 214ms

(depending on input sampling time)

Accuracy ratings : Display... $\pm 0.1\%$  of scaling range  $\pm 1$  digit

Analog output... $\pm 0.2\%$  of scaling range

(at input sampling time 46ms)

Alarm output : High/low independent setting

Output before or after modulator selectable

Output mode : Relay output or transistor output

· Relay output (2 points 1ab)

Contact ratings 250VAC 125VA, 30VDC 60VA

· Transistor output (open collector)

Rated load voltage 24VDC, Maximum load current 50mA

Response time...11 to 209ms

(depending on input sampling time)

Dummy output : 4 to 20mADC, key setting

Output correction : Broken line setting

Sensor power supply : 24VDC 100mA

Power supply : 85 to 264VAC, 50/60Hz

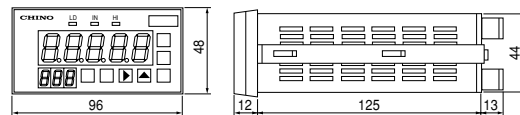
Power consumption : About 20VA

Working temperature : 0 to 50°C

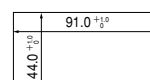
Working humidity : Lower than 90%RH (no dew condensation)

Weight : About 0.4kg

### Dimensions

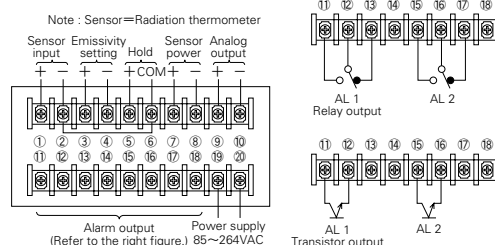


• Panel cutout



Unit : mm

### Terminal board





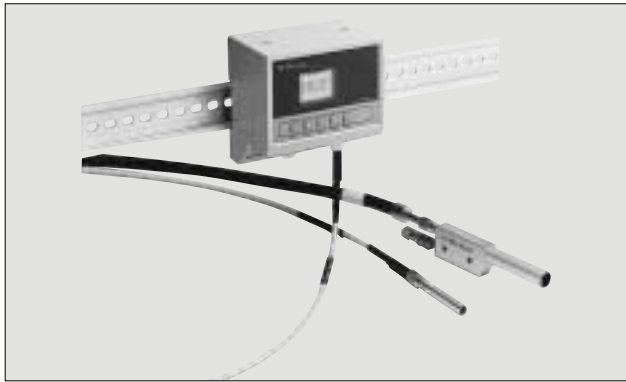




NEW

## Two-color radiation thermometers

# IR-FAQH



IR-FAQH series two-color radiation thermometers use two-wavelength system not being affected by emissivity or gray extinction and cover the high temperature of 500°C to 3000°C.

### Model

#### ● Thermometer

IR-FAQH

External input/output (option)

N : None

S : Communications interface RS-485

5 : Analog input : 4 to 20mADC

Laser targeting function (option)

N : None

L : Built-in

#### ● Lens assembly/fiber optics

IR-FL

Spot size/measuring distance

0 :  $\phi$  1/100mm

4 :  $\phi$  4/200mm

1 :  $\phi$  12/1000mm

5 :  $\phi$  5/150mm

2 :  $\phi$  5/500mm

6 :  $\phi$  20/600mm

3 :  $\phi$  2/200mm

8 :  $\phi$  8/1000mm

Air purge case

N : None

A : With case

Fiber sheath

H : Without metal protective tube

N : With metal protective tube

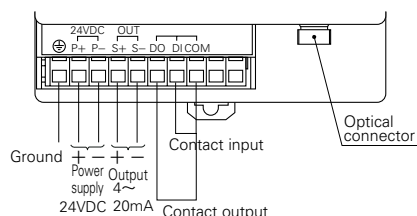
Fiber length

Length (m) to be specified

### Standard temperature range

Element	Measuring range	Lens assembly
Si/InGaAs hybrid element	500 ~ 1000°C	IR-FL5, IR-FL6
	600 ~ 1500°C	
	700 ~ 2000°C	
	800 ~ 2400°C	
	600 ~ 1500°C	IR-FL0, IR-FL3 IR-FL1, IR-FL4 IR-FL2, IR-FL8
	700 ~ 2000°C	
	800 ~ 2400°C	
	1000 ~ 3000°C	

### Terminal board



### General specifications

#### ● Thermometer

Measuring system : Two-color radiation thermometer

Element : Si/InGaAs hybrid element

Spectral response : 0.9/1.55  $\mu$ m

Measuring range : 500 to 3000°C

(Refer to the standard temperature range.)

Accuracy ratings : Lower than 1000°C  $\cdots \pm 5^\circ\text{C}$

1000 to 1500°C  $\cdots \pm 0.5\%$  of readings

1500 to 2000°C  $\cdots \pm 1.0\%$  of readings

Higher than 2000°C  $\cdots \pm 2.0\%$  of readings

(at  $\varepsilon \approx 1.0$  and reference operating conditions)

Reproducibility : 0.2°C

Temperature drift : 0.2°C/°C or 0.02% of readings/°C, whichever is larger

Resolution : 1°C

Response time : 40ms

Emissivity ratio compensation : Emissivity ratio setting  $\cdots 1.999$  to 0.050

Signal modulation : Real  $\cdots$  Original signal

Delay  $\cdots$  Tracing average value (smoothing)

(Modulation degree 0.0 to 99.9s, 0.1 increment)

Peak  $\cdots$  Tracing of maximum value

(Modulation degree 0, 2, 5, 10°C/s)

Display : LCD 4-digit (temperature display, parameter display)

Analog output : 4 to 20mADC, isolated output

(load resistance : lower than 500  $\Omega$ )

Contact output : 1 point, High (low) alarm or error signal

Contact input : 1 point, Peak hold reset or sample hold

Processing function : Zero/span adjustment, automatic emissivity ratio processing

Self-diagnosis : Thermometer temp abnormal, parameter setting error

Laser targeting function : Semiconductor laser

Analog input : Input signal  $\cdots$  4 to 20mADC

Remote emissivity ratio setting or automatic emissivity ratio processing

Communications interface : RS-485

Working temperature : 0 to 50°C

Rated power supply : 24VDC (allowable voltage fluctuation 22 to 28VDC), 130mA

Recommended power unit  $\cdots$  IR-WEP

Power consumption : About 3VA

Connection : Cramp type no screw terminals

Mounting : DIN rail mounting or wall mounting

Housing : Resin

Weight : About 250g (thermometer only)

CE-marking : EN55011 Group 1 Class A EN50082-2

#### ● Lens assembly

##### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL0		IR-FL4	
IR-FL1		IR-FL5	
IR-FL2		IR-FL6	
IR-FL3		IR-FL7	

Connection : Connector

Mounting : Screw mounting

Accessory : Exclusive air purge

Case material  $\cdots$  Aluminum

Air flow  $\cdots$  1 to 5  $\ell$  /min (normal, clean air)

#### ● Fiber optics

Fiber : Single-core quartz fiber (core diameter 400  $\mu$ m)

Sheath : Without metal protective tube

(Heat-resistive sheath/glass wool braided)

With metal protective tube

(Heat-resistive sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 150°C

Length : 4m standard

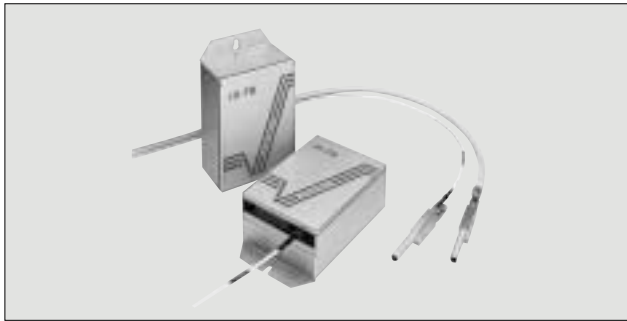
(Up to 50m upon request, up to 20m with metal protective tube)

Allowable bending radius : R100mm



# FIBER OPTIC RADIATION THERMOMETERS

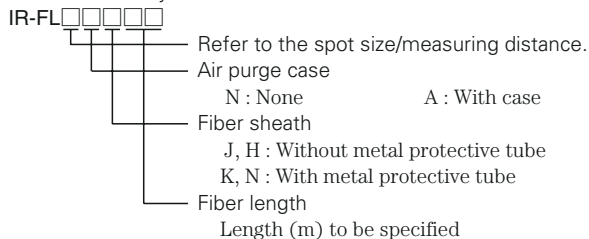
## Radiation thermometers for low temperature IR-FBC



IR-FBC is a fiber optic single-color narrow-band radiation thermometer using a cooling type PbS element and measure the low temperature from 80°C.

### Model

- Thermometer
- IR-FBC
- Lens assembly/fiber

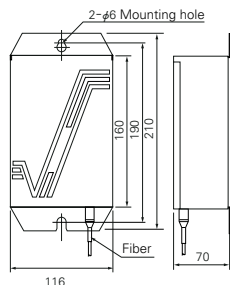


### Standard temperature range

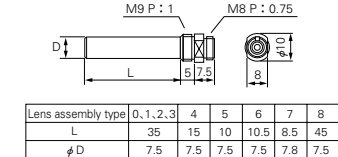
Element	Measuring range	Lens assembly
80~250°C 100~300°C	IR-FL5□J, K IR-FL6□J, L IR-FL7□J, L	J, K (Core diameter 800 μm)
250~800°C	IR-FL0□H, N IR-FL1□H, N IR-FL2□H, N IR-FL3□H, N IR-FL4□H, N	H, N (Core diameter 400 μm)
150~500°C 250~800°C	IR-FL5□H, N IR-FL6□H, N	
300~800°C	IR-FL8□H, N	

### Dimensions

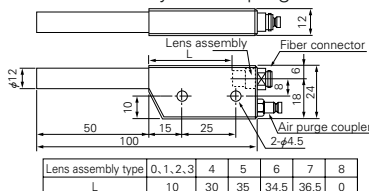
- Thermometer



- Lens assembly

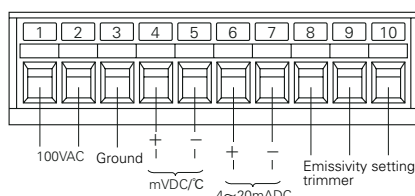


- Lens assembly with air purge case



Unit : mm

### Terminal board



### General specifications

- Thermometer
- Element : PbS (cooling type)
- Spectral response : 2.0 μm
- Measuring range : 80 to 800°C (Refer to the standard temperature range.)
- Accuracy ratings : 80 to 300°C...±4°C  
300 to 500°C...±5°C  
Higher than 500°C...±1.0% of readings  
(at ε ≐ 1.0 and reference operating conditions)
- Reproducibility : 2°C
- Resolution : 80 to 100°C...about 3°C 100 to 200°C...about 2°C  
Higher than 200°C...about 0.5°C
- Response time : About 0.5s (95% response)
- Emissivity compensation : 1.0 to 0.2  
(possible by attaching 2kΩ trimmer externally)
- Modulator : Real/peak/delay (selection)
- Modulation degree...Time constant 1, 5, 10s, 3-step
- Output signal : 4 to 20mADC (load resistance : lower than 500Ω) and  
mVDC/°C (load resistance : higher than 5kΩ)
- Working temperature : 5 to 40°C
- Power supply : 85 to 264VAC 50/60Hz
- Power consumption : About 25VA
- Connection : Terminal unit w/o screws (applicable wire : 0.14 to 2.5mm<sup>2</sup>)
- Mounting : Wall mounting, 2 pieces of M6 screw
- Housing : Steel
- Weight : About 1.6kg

- Lens assembly/fiber optics (Core diameter 800 μm)

### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL5□J IR-FL5□K		IR-FL7□J IR-FL7□K	
IR-FL6□J IR-FL6□K			

Fiber : Single-core quartz fiber

Sheath : Without metal protective tube

(Heat-resistant sheath/glass wool braided)

With metal protective tube

(Heat-resistant sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 50°C (measuring range : 80 to 120°C)

Up to 80°C (measuring range : higher than 120°C)

Length : 2m

Allowable bending radius : R150mm

Connection : Connector

Mounting : Screw mounting

Accessory : Exclusive air purge Case material...Aluminum

Air flow...1 to 5 ℓ/min (clean air)

- Lens assembly/fiber optics (Core diameter 400 μm)

### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL0□H IR-FL0□N		IR-FL4□H IR-FL4□N	
IR-FL1□H IR-FL1□N		IR-FL5□H IR-FL5□N	
IR-FL2□H IR-FL2□N		IR-FL6□H IR-FL6□N	
IR-FL3□H IR-FL3□N		IR-FL8□H IR-FL8□N	

Fiber : Single-core quartz fiber

Sheath : Without metal protective tube

(Heat-resistant sheath/glass wool braided)

With metal protective tube

(Heat-resistant sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 150°C

Length : 4m standard (up to 5m)

Allowable bending radius : R100mm

Connection : Connector

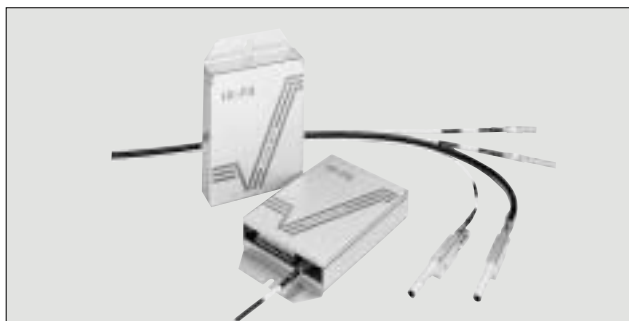
Mounting : Screw mounting

Accessory : Exclusive air purge Case material...Aluminum

Air flow...1 to 5 ℓ/min (clean air)



## Radiation thermometers for medium/high temperature IR-FB



IR-FB series are fiber optic single-color narrow-band radiation thermometers using an InGaAs or Si element and measure the wide temperature of 150 to 3000°C

### Model

- Thermometer

IR-FB

Element

I : InGaAs

S : Si

High-speed type

Blank : Standard type

H : High-speed type

- Lens assembly/fiber optics

IR-FL

Spot size/measuring distance

0 :  $\phi$  1/100mm 4 :  $\phi$  4/200mm

1 :  $\phi$  12/1000mm 5 :  $\phi$  5/150mm

2 :  $\phi$  5/500mm 6 :  $\phi$  20/600mm

3 :  $\phi$  2/200mm 8 :  $\phi$  8/1000mm

Air purge case

N : None

A : With case

Fiber sheath

H : Without metal protective tube

N : With metal protective tube

Fiber length

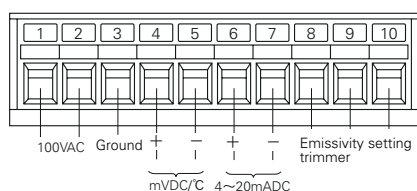
Length (m) to be specified

### Standard temperature range

Element	Measuring range	Lens assembly	Element	Measuring range	Lens assembly
InGaAs	200 ~ 450°C*	IR-FL0	Si	500 ~ 900°C*	IR-FL0
	250 ~ 600°C	IR-FL1		600 ~ 1100°C	IR-FL1
	350 ~ 900°C	IR-FL2		800 ~ 1600°C	IR-FL2
	400 ~ 1100°C	IR-FL3		1100 ~ 3000°C	IR-FL3
	500 ~ 1300°C	IR-FL4			IR-FL4
	150 ~ 350°C*	IR-FL5		400 ~ 700°C*	IR-FL5
	200 ~ 450°C	IR-FL6		500 ~ 900°C	IR-FL6
	250 ~ 600°C			600 ~ 1100°C	
	350 ~ 900°C			800 ~ 1600°C	
	400 ~ 1100°C			1100 ~ 3000°C	
	500 ~ 1300°C				
	250 ~ 450°C*	IR-FL8		550 ~ 900°C*	IR-FL8
	300 ~ 600°C			650 ~ 1100°C	
	400 ~ 900°C			850 ~ 1600°C	
	450 ~ 1100°C			1150 ~ 3000°C	
	550 ~ 1300°C				

\*The high-speed type is not available.

### Terminal board



### General specifications

- Thermometer

Element : InGaAs or Si

Spectral response : InGaAs...1.55  $\mu$ m, Si...0.9  $\mu$ m

Measuring range : 150 to 3000°C (Refer to the standard temperature range.)

Accuracy ratings : InGaAs Lower than 1000°C... $\pm 5^\circ\text{C}$

Higher than 1000°C... $\pm 0.5\%$  of readings

Si Lower than 800°C... $\pm 4^\circ\text{C}$

800 to 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

Higher than 2000°C... $\pm 2.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : 1/3 of accuracy rating or  $\pm 2^\circ\text{C}$ , whichever is larger

Resolution : InGaAs

Lower than 200°C...about  $1^\circ\text{C}$ , about  $2^\circ\text{C}$  for high-speed type

Higher than 200°C...about  $0.5^\circ\text{C}$ , about  $1^\circ\text{C}$  for high-speed type

Si about  $0.5^\circ\text{C}$ , about  $1^\circ\text{C}$  for high-speed type

Response time : About 10ms, about 0.5ms for high-speed type (95% response)

Emissivity compensation : 1.0 to 0.2

(possible by attaching 2k  $\Omega$  trimmer externally)

Modulator : Real/peak/delay (selection)

Modulation degree...Time constant 1, 5, 10s, 3-step

Output signal : 4 to 20mA DC (load resistance : lower than 500  $\Omega$ ) and mVDC/°C (load resistance : higher than 5k  $\Omega$ )

Working temperature : 0 to 50°C

Power supply : 85 to 132VAC or 175 to 264VAC (to be specified), 50/60Hz

Power consumption : About 4VA

Connection : Terminal unit w/o screws (applicable wire : 0.14 to 2.5mm<sup>2</sup>)

Mounting : Wall mounting, 2 pieces of M6 screw

Housing : Steel

Weight : About 1kg

- Lens assembly/fiber optics (Core diameter 400  $\mu$ m)

### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL0		IR-FL4	
IR-FL1		IR-FL5	
IR-FL2		IR-FL6	
IR-FL3		IR-FL8	

Fiber : Single-core quartz fiber

Sheath : Without metal protective tube

(Heat-resistive sheath/glass wool braided)

With metal protective tube

(Heat-resistive sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 150°C

Length : 4m standard

(up to 50m upon request, up to 20m with metal protective tube)

Allowable bending radius : R100mm

Connection : Connector

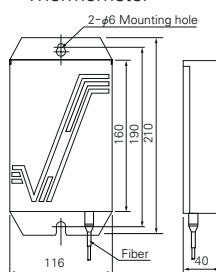
Mounting : Screw mounting

Accessory : Exclusive air purge Case material...Aluminum

Air flow...1 to 5  $\ell$  /min (clean air)

### Dimensions

- Thermometer



- Lens assembly

M9 P : 1	M8 P : 0.75
7.5	5
L	7.5
8	8
Lens assembly type	0, 1, 2, 3
L	35
	15
	4
	5
	6
	8
	10.5
	45

- Lens assembly with air purge case

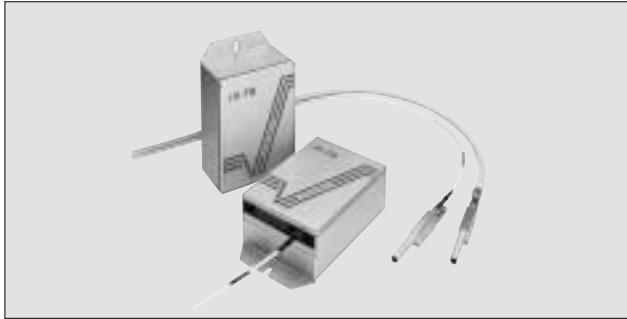
Lens assembly	L	50	15	25	100	150	250	350	450
Fiber connector	12	12	12	12	12	12	12	12	12
Air purge coupler	2-#4.5	2-#4.5	2-#4.5	2-#4.5	2-#4.5	2-#4.5	2-#4.5	2-#4.5	2-#4.5
Lens assembly type	0, 1, 2, 3	4	5	6	8				
L	10	30	35	34.5	0				

Unit : mm



# FIBER OPTIC RADIATION THERMOMETERS

## Wide-range type radiation thermometers IR-FBW



IR-FBW series are fiber optic single-color narrow-band radiation thermometers using 2 elements of InGaAs/InGaAs or Si/InGaAs. The measuring temperature is wide by utilizing 2 elements.

### Model

#### ● Thermometer

IR-FBW

Element

I : InGaAs/InGaAs      S : Si/InGaAs  
W : Si/InGaAs (Ultra wide-range type)

High-speed type

Blank : Standard type      H : High-speed type\*  
\*The ultra wide-range type is not available

#### ● Lens assembly/fiber optics

IR-FL

Spot size/measuring distance

0 :  $\phi$  1/100mm      4 :  $\phi$  4/200mm  
1 :  $\phi$  12/1000mm      5 :  $\phi$  5/150mm  
2 :  $\phi$  5/500mm      6 :  $\phi$  20/600mm  
3 :  $\phi$  2/200mm      8 :  $\phi$  8/1000mm

Air purge case

N : None      A : With case

Fiber sheath

H : Without metal protective tube  
N : With metal protective tube

Fiber length

Length (m) to be specified

### Standard temperature range

Element	Measuring range	Switching point	Lens assembly
InGaAs/ InGaAs	250~1300°C* <sup>1</sup>	600°C	IR-FL0 IR-FL3
	300~1600°C	750°C	IR-FL1 IR-FL4
	200~1100°C* <sup>1</sup>	450°C	IR-FL5
	250~1300°C	600°C	IR-FL6
Si/ InGaAs	300~1600°C	750°C	
	300~1300°C* <sup>1</sup>	600°C	IR-FL8
	350~1600°C	750°C	
	250~1100°C* <sup>1</sup>	600°C	IR-FL0
	300~1300°C	750°C	IR-FL1
	400~2200°C	1100°C	IR-FL2
	500~3000°C	1300°C	IR-FL3
	300~3000°C* <sup>2,3</sup>	900°C	IR-FL4
	200~700°C* <sup>1</sup>	450°C	IR-FL5
	250~1100°C	600°C	IR-FL6
	300~1300°C	750°C	
	400~2200°C	1100°C	
	500~3000°C	1300°C	
	250~3000°C* <sup>2</sup>	900°C	
	300~1100°C* <sup>1</sup>	600°C	IR-FL8
	350~1300°C	750°C	
	450~2200°C	1100°C	
	550~3000°C	1300°C	
	350~3000°C* <sup>2</sup>	900°C	

\*1 The high-speed type is not available.

\*2 IR-FBW (Ultra wide-range type) only.

\*3 The lens assembly IR-FL0 is not applied.

\* Independent outputs of low and high ranges are available.

### General specifications

#### ● Thermometer

Element : InGaAs/InGaAs or Si/InGaAs

Spectral response : InGaAs/InGaAs...1.55/1.55  $\mu$ m

Si/InGaAs...0.9/1.55  $\mu$ m

Measuring range : 200 to 3000°C (Refer to the standard temperature range.)

Accuracy ratings : InGaAs Lower than 1000°C... $\pm 5^\circ\text{C}$

Higher than 1000°C... $\pm 0.5\%$  of readings

Si Lower than 800°C... $\pm 4^\circ\text{C}$

800 to 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

Higher than 2000°C... $\pm 2.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : 1/3 of accuracy rating or  $\pm 2^\circ\text{C}$ , whichever is larger

Resolution : InGaAs Lower than 250°C... about 1°C, about 2°C for

high-speed type

Higher than 250°C... about 0.5°C about 1°C for

high-speed type

Si about 0.5°C, about 1°C for high-speed type

Response time : About 20ms, about 2ms for high-speed type\* (95% response)

\*High-speed type is not available for ultra wide-range type.

Emissivity compensation : 1.0 to 0.2

(independent compensation for each element)

Modulator : Real/peak/delay (selection)

Modulation degree...Time constant 1, 5, 10s, 3-step

Output signal : 4 to 20mADC (load resistance : lower than 500  $\Omega$ )

Continuous 1 output or independent 2 outputs

Working temperature : 0 to 50°C

Power supply : 85 to 132VAC or 175 to 264VAC (to be specified), 50/60Hz

Power consumption : About 6VA

Connection : Terminal unit w/o screws (applicable wire : 0.14 to 2.5mm<sup>2</sup>)

Mounting : Wall mounting, 2 pieces of M6 screw

Housing : Steel

Weight : About 1.2kg

#### ● Lens assembly/fiber optics (Core diameter 400 $\mu$ m)

#### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL0		IR-FL4	
IR-FL1		IR-FL5	
IR-FL2		IR-FL6	
IR-FL3		IR-FL8	

Fiber : Single-core quartz fiber

Sheath : Without metal protective tube

(Heat-resistive sheath/glass wool braided)

With metal protective tube

(Heat-resistive sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 150°C

Length : 4m standard

(up to 50m upon request, up to 20m with metal protective tube)

Allowable bending radius : R100mm

Connection : Connector

Mounting : Screw mounting

Accessory : Exclusive air purge

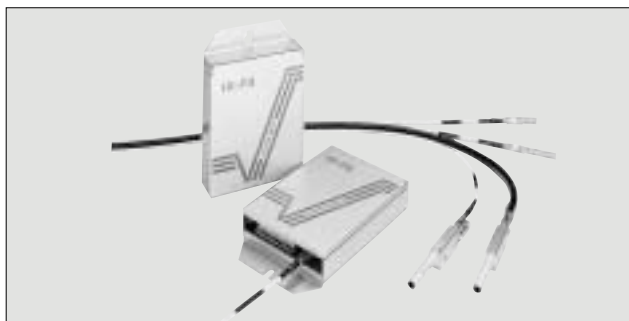
Case material...Aluminum

Air flow...1 to 5  $\ell$  /min (clean air)



## Two-color radiation thermometers

# IR-FBQ



IR-FBQ series two-color radiation thermometers use two-wavelength system not being affected by emissivity or gray extinction and cover the medium/high temperature of 250°C to 3000°C

### Model

#### ● Thermometer

IR-FBQ

Element

I : InGaAs

S : Si

High-speed type

Blank : Standard type

H : High-speed type

#### ● Lens assembly/fiber optics

IR-FL

Spot size/measuring distance

0 :  $\phi$  1/100mm 4 :  $\phi$  4/200mm

1 :  $\phi$  12/1000mm 5 :  $\phi$  5/150mm

2 :  $\phi$  5/500mm 6 :  $\phi$  20/600mm

3 :  $\phi$  2/200mm 8 :  $\phi$  8/1000mm

Air purge case

N : None

A : With case

Fiber sheath

H : Without metal protective tube

N : With metal protective tube

Fiber length

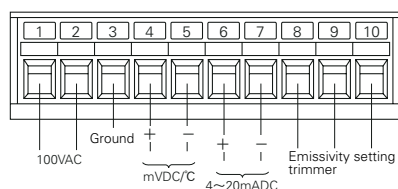
Length (m) to be specified

### Standard temperature range

Element	Measuring range	Lens assembly	Element	Measuring range	Lens assembly
InGaAs	300 ~ 650°C*	IR-FL0	Si	800 ~ 1600°C*	IR-FL0
	350 ~ 800°C	IR-FL1		1000 ~ 2000°C	IR-FL1
	400 ~ 1000°C	IR-FL2		1300 ~ 3000°C	IR-FL2
	400 ~ 1300°C	IR-FL3			IR-FL3
	600 ~ 1500°C	IR-FL4			IR-FL4
	250 ~ 500°C*	IR-FL5		700 ~ 1300°C*	IR-FL5
	300 ~ 650°C	IR-FL6		800 ~ 1600°C	IR-FL6
	350 ~ 800°C			1000 ~ 2000°C	
	400 ~ 1000°C			1300 ~ 2000°C	
	500 ~ 1300°C				
	600 ~ 1500°C				
	350 ~ 650°C*	IR-FL8		850 ~ 1600°C*	IR-FL8
	400 ~ 800°C			1050 ~ 2000°C	
	450 ~ 1000°C			1350 ~ 3000°C	
	550 ~ 1300°C				
	650 ~ 1500°C				

\*The high-speed type is not available.

### Terminal board



### General specifications

#### ● Thermometer

Element : InGaAs or Si

Spectral response : InGaAs...1.35/1.55  $\mu$ m, Si...0.85/1.0  $\mu$ m

Measuring range : 250 to 3000°C

(Refer to the standard temperature range.)

Accuracy ratings : InGaAs Lower than 1000°C... $\pm 5^\circ\text{C}$

Higher than 1000°C... $\pm 0.5\%$  of readings

Si Lower than 1500°C... $\pm 0.5\%$  of readings

1500 to 2000°C... $\pm 1.0\%$  of readings

Higher than 2000°C... $\pm 2.0\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility : 1°C, 2°C for high-speed type

Resolution : About 1°C, about 2°C for high-speed type

Response time : About 20ms, about 0.5ms for high-speed type (95% response)

Emissivity ratio compensation : 1.25 to 0.75 (possible by attaching 2k $\Omega$  trimmer externally)

Modulator : Real/peak/delay (selection)

Modulation degree...Time constant 1, 5, 10s, 3-step

Output signal : 4 to 20mADC (load resistance : lower than 500 $\Omega$ ) and mVDC/°C (load resistance : higher than 5k $\Omega$ )

Working temperature : 0 to 50°C

Power supply : 85 to 132VAC or 175 to 264VAC (to be specified), 50/60Hz

Power consumption : About 6VA

Connection : Terminal unit w/o screws (applicable wire : 0.14 to 2.5mm<sup>2</sup>)

Housing : Steel

Weight : About 1.1kg

#### ● Lens assembly/fiber optics (Core diameter 400 $\mu$ m)

### Spot size/measuring distance

Model	Spot size/distance (mm)	Model	Spot size/distance (mm)
IR-FL0	$\phi 7$ 200, $\phi 1$ 100, $\phi 5$ 0	IR-FL4	$\phi 18$ 500, $\phi 4$ 200, $\phi 5$ 0
IR-FL1	$\phi 21$ 1500, $\phi 12$ 1000, $\phi 5$ 0	IR-FL5	$\phi 29$ 500, $\phi 5$ 150, $\phi 5$ 0
IR-FL2	$\phi 11$ 800, $\phi 5$ 500, $\phi 5$ 0	IR-FL6	$\phi 37$ 1000, $\phi 20$ 600, $\phi 5$ 0
IR-FL3	$\phi 14$ 500, $\phi 2$ 200, $\phi 5$ 0	IR-FL8	$\phi 15$ 1500, $\phi 8$ 1000, $\phi 5$ 0

Fiber : Single-core quartz fiber

Sheath : Without metal protective tube

(Heat-resistive sheath/glass wool braided)

With metal protective tube

(Heat-resistive sheath/glass wool braided + SUS flexible tube)

Working temperature : Up to 150°C

Length : 4m standard

(up to 50m upon request, up to 20m with metal protective tube)

Allowable bending radius : R100mm

Connection : Connector

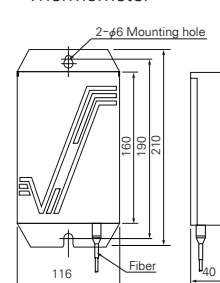
Mounting : Screw mounting

Accessory : Exclusive air purge Case material...Aluminum

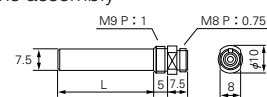
Air flow...1 to 5  $\ell$  /min (clean air)

### Dimensions

#### ● Thermometer

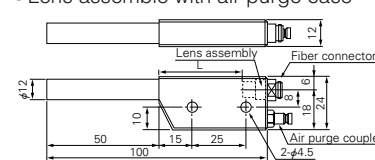


#### ● Lens assembly



Lens assembly type	0, 1, 2, 3	4	5	6	8
L	35	15	10	10.5	45

#### ● Lens assembly with air purge case



Lens assembly type	0, 1, 2, 3	4	5	6	8
L	10	30	35	34.5	0

Unit : mm



# COMPACT RADIATION THERMOMETERS

High-speed compact radiation thermometers  
(with built-in converter)

## IR-BHT



IR-BHT series are compact radiation thermometers to quickly measure temperature without any physical contact and can be used as FA sensors and temperature switches.

Converting function and alarm function are built-in the thermometer, and analog output and alarm output are standard.

### Model

- Thermometer

IR-BHT□1□

Spot size/measuring distance

1 :  $\phi$  40/500mm (standard)

2 :  $\phi$  5/80mm (small spot/short distance type)

S :  $\phi$  40/1000mm (small spot/long distance type)

High-speed type

Blank : Standard type

M : High-speed type

- Indicator with power supply

IR-GBHA1

### General specifications

- Thermometer

Measuring system : Wide-band radiation thermometer

Element : Thermopile

Spectral response : 8 to 13  $\mu$ m

Measuring range : 0 to 300°C

Accuracy ratings : Lower than 200°C... $\pm 3^\circ\text{C}$

Higher than 200°C... $\pm 1.5\%$  of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Reproducibility :  $\pm 0.2^\circ\text{C}$

Resolution : 0.2°C

Response time : Standard...shorter than 0.1s

(95% response) Small spot/long distance type...shorter than 0.2s

High-speed type...50ms

Optics : Ge lens

Spot size : Refer to the spot size/measuring distance.

Emissivity compensation : 0.2 to 1.8 (semi fixed trimmer)

Analog output : 4 to 20mADC (load resistance : lower than 280  $\Omega$ )

Alarm setting : By trimmer (rear side)

Alarm output : Open collector

Voltage lower than 30VDC

Current rating lower than 100mA

Working temperature : 0 to 50°C

Power supply : 12 to 24VDC  $\pm 10\%$

Power consumption : Lower than 60mA

Cable length : 2m standard

(up to 200m, extension cable for the length more than 2m)

Water-proof : JIS C0920, Splash proof II type IP-X2

Mounting : 2 pieces of M4 screw or on tripod

Housing : Die-cast aluminum

Weight : About 220g

- Indicator with power supply

Input signal : 4 to 20mADC

Display range : 0 to 300°C

Display : LED, character height 15mm

Analog output : 4 to 20mADC

(load resistance : lower than 550  $\Omega$ , isolated output)

Working temperature : 0 to 50°C

Working humidity : Lower than 85%RH (no dew condensation)

Power supply : 100VAC, 50/60Hz

Power supply to thermometer : 24VDC, 80mA

Power consumption : About 7VA

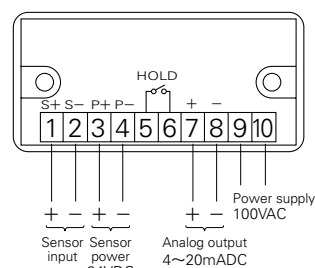
Weight : About 500g

### Standard temperature range

Model	Spot size/measuring distance (mm)	
IR-BHT11	$\phi$ 40/500mm	
IR-BHT21	$\phi$ 5/80mm	
IR-BHTS1	$\phi$ 40/1000mm	

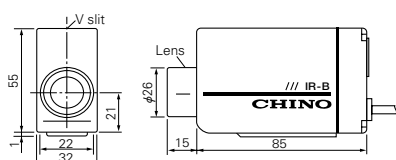
### Terminal board

- Indicator with power supply

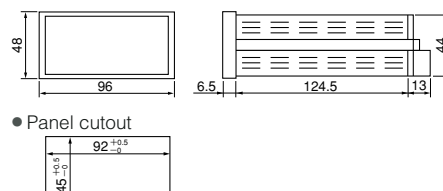


### Dimensions

- Thermometer



- Indicator with power supply



Unit : mm



NEW

## Compact radiation thermometers for combustion gas IR-BHTH1



This thermometer measures temperature of combustion furnaces by measuring temperature of CO<sub>2</sub> gas included with combustion gas. As the density of the gaseous object is low, the thickness more than 1m for the measuring direction is necessary.

### Model

- Thermometer
- IR-BHTH1

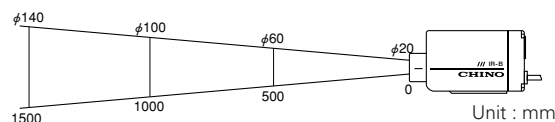
- Indicator with power supply
- IR-GBHH

### General specifications

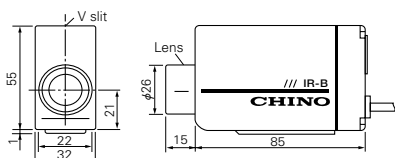
- Thermometer
- Element : Thermopile
- Spectral response : 4.3 μm
- Measuring range : 500 to 1300°C
- Accuracy ratings : ±1.5% of readings  
(at ε ≐ 1.0 and reference operating conditions)
- Response time : About 10s (95% response)
- Analog output : 4 to 20mADC (load resistance : lower than 280 Ω)
- Power supply : 12 to 24VDC
- Power consumption : Lower than 60mA
- Cable length : 5m
- Housing : Die-cast aluminum
- Weight : About 220g

- Indicator with power supply
- Refer to the indicator with power supply (IR-GBHA1) for IR-BHT.

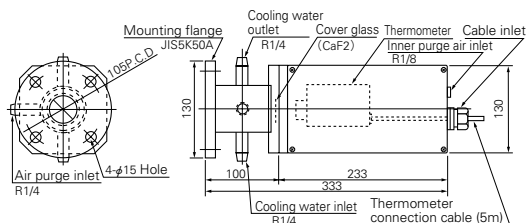
### Standard temperature range



### Dimensions



- IR-ZBCH (exclusive for IR-BHTH1)



Unit : mm

## Converters with reflection correction IR-GBG



IR-GBG is a converter that can correct the affection of radiation energy from surroundings.

### Model

- Thermometer
- IR-GBG
  - Radiation thermometer
    - 1 : IR-BT series (non-linear type)
    - 2 : IR-BHT series (linear type)
  - Thermometer for surrounding radiation
    - 1 : Pt100
    - 2 : 4 to 20mADC (linear)

### General specifications

- Input signal : Radiation thermometer... 4 to 20mADC (linear)  
0 to 5VDC (non-linear)
- Thermometer for surrounding radiation...  
Pt100 3-wire type  
4 to 20mADC (linear)
- Emissivity remote setting signal...  
4 to 20mADC/0.000 to 1.000

Processing : ① Reflection correction

$$L(T) = \frac{L(T_s) - \beta(1 - \epsilon)L(T_b)}{\epsilon}$$

$L(T)$  : Radiation energy of object temperature T

$L(T_b)$  : Radiation energy of surrounding temperature  $T_b$

$\epsilon$  : Emissivity

$\beta$  : Optical correction coefficient

② Linearization (ROM table system)

③ Sensor correction

Emissivity compensation : 1.000 to 0.000 (0.001 increment)

Signal modulation : Mode...Real, peak, delay

Modulation degree...Time constant 0.0 to 99.9s

Display : Temperature, parameter... 7-segment LED 4-digit 2 lines

Alarm, setting status...LED 10 pieces

Output update cycle : 0.2s

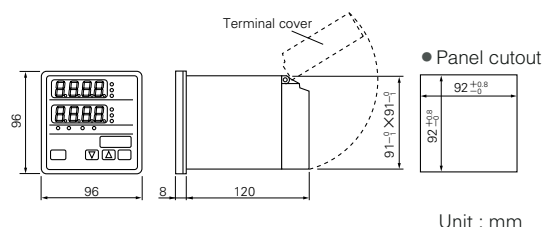
Output signal : 4 to 20mADC (load resistance : lower than 600 Ω)

Isolated output

Alarm output : High/low independent setting, relay contact output  
(2 points with 1 common)

Power supply : 85 to 264VAC, 50/60Hz

### Dimensions



Unit : mm



# COMPACT RADIATION THERMOMETERS

## Compact radiation thermometers

### IR-B



IR-B series are low temperature wide-band radiation thermometers using a thermopile element. The thermometer and the converter feature compact, lightweight and easy-to-use. An exclusive model for glass temperature is available.

#### Model

- Thermometer

IR-BT

Model (spot size/measuring distance)

0 : Universal type (  $\phi$  50/500mm)

1 : General type,

low/medium temp (  $\phi$  40/500mm)

2 : General type, low temp (  $\phi$  5/80mm)

3 : Small spot size type (  $\phi$  1.2/65mm)

4G : For glass (  $\phi$  20/150mm)

1F1 : For lamp annealing (  $\phi$  40/500mm)

1F1 : For polyethylene film (  $\phi$  40/500mm)

1F2 : For polyester film (  $\phi$  40/500mm)

#### Spot size/measuring distance

Model	Spot size/measuring distance (mm)	
IR-BT0	$\phi$ 50/500mm	
IR-BT1 IR-BT1F1 IR-BT1F2	$\phi$ 40/500mm	
IR-BT2	$\phi$ 5/80mm	
IR-BT3	$\phi$ 1.2/65mm	
IR-BT4G	$\phi$ 20/150mm	

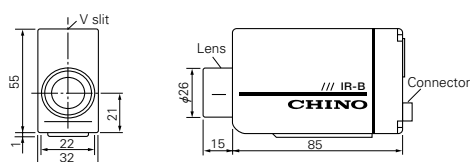
#### General specifications

Model	Universal	General (Low/medium temp)	General (Low temp)	Small spot size	Glass	Lamp annealing	Polyethylene film	Polyester film
	IR-BT0	IR-BT1	IR-BT2	IR-BT3	IR-BT4G	IR-BT1F1	IR-BT1F1*2	IR-BT1F2
Measuring system	Wide-band radiation thermometer							
Element	Thermopile							
Spectral response	8~13 $\mu$ m	8~13 $\mu$ m	8~13 $\mu$ m	8~13 $\mu$ m	4.6~5.2 $\mu$ m	3.43 $\mu$ m (Half-value band 120nm)	3.43 $\mu$ m (Half-value band 120nm)	7.9 $\mu$ m
Range	0~300℃	0~600℃	0~300℃	0~300℃	100~400℃	400~1300℃	80~250℃	50~150℃
Accuracy ratings*1	±5℃	Lower than 300℃... ±3℃ Higher than 300℃... ±1% of readings	±3℃	±3℃	±4℃	±1% of readings	±4℃	±4℃
Reproducibility	±0.5℃	±0.3℃	±0.5℃	±0.3℃	±0.3℃	±0.6℃	±0.6℃	±0.6℃
Response time (95% response)	Shorter than 1.0s	Shorter than 1.0s	Shorter than 1.0s	Shorter than 0.7s	Shorter than 1.0s	About 1.0s	About 1.0s	About 1.0s
Optics	Ge lens	Ge lens	BaF <sub>2</sub> lens	Cassegrain	Ge lens	Ge lens	Ge lens	Ge lens
Targeting	—	—	LED spot marker	LED spot marker	—	—	—	—
Spot size	Refer to the spot size/measuring distance.							
Working temperature	0 to 40℃	0 to 50℃	0 to 50℃	0 to 50℃	0 to 50℃	0 to 50℃	0 to 50℃	0 to 50℃
Connection	Connector							
Cable length	5m standard (up to 20m)							
Weight	About 220g	About 220g	About 220g	About 400g	About 220g	About 220g	About 220g	About 220g
Mounting	2 pieces of M4 screw or on tripod							

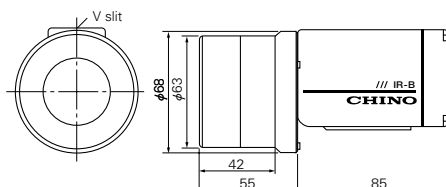
\*1 : The accuracy ratings are at  $\epsilon \approx 1.0$  and reference operating on conditions. \*2 : A water-cooling jacket is necessary. Ask CHINO.

#### Dimensions

- IR-BT0, 1, 2, 4G, 1F1, 1F2



- IR-BT3



Unit : mm



## Converters for IR-B

# IR-GB



IR-GB series are converters that receive temperature signal from the IR-BT series compact radiation thermometers and output specific signals after emissivity (ratio) compensation, linearization, and signal modulation. The converters with control function are available.

### Model

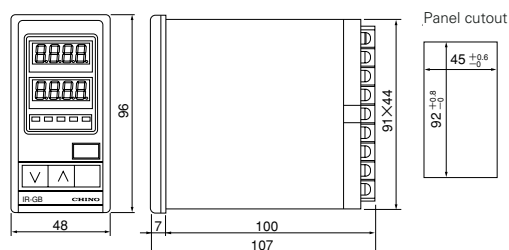
- Thermometer

IR-GB□

Control function

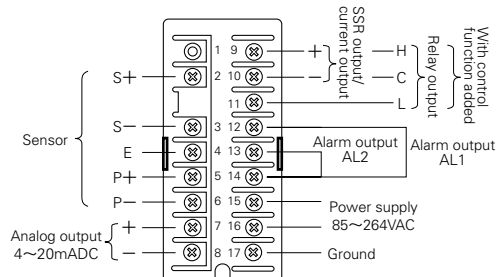
- 0 : None (standard)
- 1 : On-off pulse PID
- 3 : Current output PID
- 5 : SSR drive pulse PID
- 0S : None (Exclusive use for IR-BT0)
- 0G : None (Exclusive use for IR-BT4G)
- 0F1 : None (Exclusive use for IR-BT1F1)
- 0F2 : None (Exclusive use for IR-BT1F2)

### Dimensions



Unit : mm

### Terminal board



### General specifications

- Standard type/Exclusive type
- Emissivity compensation : 1.00 to 0.10 (0.01 increment)
- Linearization : Approximation accuracy within 1°C
- Signal modulation : Mode...Real, peak and delay
- Modulation degree...0.0 to 99.9s
- Measured value output : 4 to 20mADC (load resistance : lower than 500 Ω)
- Output scaling : Optional setting at zero and span
- Output update cycle : 0.1s
- Display : 7-segment LED, 4-digit 2 lines
- Independent LED states display 5 pieces
- Alarm : Absolute high/low, deviation high/low and deviation high/low with standby (absolute high/low only for exclusive type)
- Alarm point : 2 points
- Alarm contact rating : Resistive load 100VAC 1A, 200VAC 0.5A
- Inductive load 100VAC 0.5A, 200VAC 0.2A
- Minimum load 5VDC 10mA
- Relay make contact (1 common)
- Power supply : 85 to 264VAC 50/60Hz
- Power consumption : About 9VA
- Weight : About 300g

- Converter with control function
- Emissivity compensation : 1.00 to 0.10 (0.01 increment)
- Linearization : Approximation accuracy within 1°C
- Signal modulation : Mode...Real, peak and delay
- Modulation degree...0.0 to 99.9s
- Measured value output : 4 to 20mADC (load resistance : lower than 500 Ω)
- Output scaling : Optional setting at zero and span
- Output update cycle : 0.1s
- Control system : On-off pulse PID
- Current output PID
- SSR drive pulse PID
- Control setting range : Within measuring range
- PID constant : Auto-tuning or manual setting
- P ...0.1 to 999.9%
- I ...0 to 9999s
- D ...0 to 9999s
- Control output : • Current output
- Output signal...4 to 20mADC
- Load resistance...lower than 500 Ω
- On-off pulse
- Output signal...Relay contact HCL output
- Contact rating...Resistive load 100VAC 2A, 200VAC 1A
- Inductive load 100VAC 1A, 200VAC 0.5A
- Minimum load 5VDC 10mA
- Pulse cycle...1 to 100s
- SSR drive pulse
- Output signal...DC voltage pulse signal
- at ON 14VDC ± 20%
- at OFF lower than 0.6VDC
- Load capacity...Lower than 20mA
- Pulse cycle...1 to 100s
- Display : 7-segment LED, 4-digit 2 lines
- Independent LED status display 5 pieces
- Alarm : Absolute high/low, deviation high/low and deviation high/low with standby (absolute high/low only for exclusive type)
- Alarm point : 2 points
- Alarm contact rating : Resistive load 100VAC 1A, 200VAC 0.5A
- Inductive load 100VAC 0.5A, 200VAC 0.2A
- Minimum load 5VDC 10mA
- Relay make contact (1 common)
- Power supply : 85 to 264VAC 50/60Hz
- Power consumption : About 9VA
- Weight : About 300g



# RADIATION THERMOMETERS

## Radiation thermometers

### IR-S



IR-S series are narrow-band radiation thermometers using a Si element and measure the medium/high temperature of 400 to 2200°C.

#### Model

##### Thermometer

IR-S□□

Model

S : Standard type B : Small type

Refer to the spot size/measuring distance.

##### Converter

IR-GA□S

Model

B : Back-of-panel type (w/o monitor)

P : Panel-mount type

W : Wall-mount type

#### General specifications (Thermometer)

Measuring system : Narrow-band radiation thermometer

Element : Si

Spectral response : 0.9 μm

Measuring range : 400 to 2200°C

(Refer to the standard temperature range.)

Accuracy ratings : 400 to 800°C...±1.0% of readings

800 to 1500°C...±0.7% of readings

1500 to 2200°C...±1.0% of readings

(at ε = 1.0 and reference operating conditions)

Response time : Shorter than 0.001s (95% response)

Working temperature : 0 to 70°C (0 to 150°C with water-cooling jacket)

Cable length : Up to 200m (exclusive cable)

For using pre-amplifier, up to 50m between thermometer and pre-amplifier

Mounting : Screw fixing to mounting flange or water-cooling jacket

Weight : IR-SS...about 1.1kg, IR-SB...about 280g

#### Model list

Model		Spot size/ measuring distance	Measuring range		Output signal
			Standard range	Expanded range	
Standard	IR-SS1		400~600℃ * 500~750℃ *	400 ~ 700℃ * 500 ~ 950℃ *	0 to 1mA (pre-amplifier output, external resistance : within 2kΩ)
	IR-SS2		600 ~ 900℃ * 700 ~ 1100℃ 1000 ~ 1600℃ 800 ~ 1200℃ 1200 ~ 2000℃ 900 ~ 1400℃	600 ~ 1200℃ * 700 ~ 1400℃ 900 ~ 1900℃ 800 ~ 1700℃ 1000 ~ 2200℃	0 to 1mA (pre-amplifier output, external resistance : within 2kΩ) Standard range 0 to 20mV, Expanded range 0 to 100mV (output resistance : lower than 1kΩ)
	IR-SS3		1000 ~ 1600℃ 1200 ~ 2000℃	1000 ~ 2200℃ * ————	0 to 1mA (pre-amplifier output, external resistance : within 2kΩ) 0 to 20mV (output resistance : lower than 1kΩ)
	IR-SS4		800 ~ 1200℃ 1000 ~ 1600℃ 1200 ~ 2000℃	800 ~ 1700℃ * 1000 ~ 2200℃	0 to 1mA (pre-amplifier output, external resistance : within 2kΩ) Standard range 0 to 20mV, Expanded range 0 to 100mV (output resistance : lower than 1kΩ)
Small	IR-SB1		600 ~ 900℃ * 700 ~ 1100℃ 1000 ~ 1600℃ 800 ~ 1200℃ 1200 ~ 2000℃ 900 ~ 1400℃	600 ~ 1200℃ * 700 ~ 1400℃ 900 ~ 1900℃ 800 ~ 1700℃ 1000 ~ 2200℃	0 to 1mA (pre-amplifier output, external resistance : within 2kΩ) Standard range 0 to 20mV, Expanded range 0 to 100mV (output resistance : lower than 1kΩ)

\* Pre-amplifier to be connected

#### General specifications (Converter)

Model		Back-of-panel type (IR-GABS)	Panel-mount type (IR-GAPS), Wall-mount type (IR-GAWS)
Modulator	Emissivity compensation	1.000 to 0.100 Digital switch setting	1.000 to 0.100 Shift-key switch setting
	Signal modulation mode	Delay...Tracing of average value (smoothing)	Real...Original signal, Delay...Tracing of average value (smoothing), Peak...Tracing of maximum value, Valley...Tracing of minimum value
	Modulation degree	0.99s (63%) Trimmer setting	0 to 99s (63%) Shift-key switch setting, 0 to 9.9s (0.1s increment), 10 to 99s (1s increment)
	Hold	Output hold by remote contacts (a contact)	
Display	Modulation release	—	Shifts to Real by remote contacts (a contact)
	Display	—	LED 4-signt (orange), character height 15mm (25mm for IR-GAWS), temperature and parameter selective display
Output signal		4 to 20mADC (load resistance : lower than 550Ω) 0 to 10mVDC (output resistance : 10Ω) isolated output	4 to 20mADC (load resistance : lower than 550Ω) 0 to 10mVDC (output resistance : 10Ω) independent isolated output
Output scaling		Thermometer range	Optional setting at zero and span (1°C increment)
Output update cycle		0.05s (response time 0.1s/95% response)	
Accuracy rating	Display	—	±0.1% of readings ± 1 digit
	Analog output	±0.2% of thermometer range	
Alarm output		—	High/low independent setting Setting range...Full range Output terminals...2 sets of H, C and L terminals Contact rating...100VAC1A (resistive load) Judgement...before modulator
Weight		About 2kg	IR-GAPS about 2.5kg, IR-GAWS about 6kg
Power supply		100, 110, 200, 220VAC (to be specified), 50/60Hz	
Allowable voltage fluctuation		90 to 110% of rated value	
Power consumption		About 20VA	
Working temperature		0 to 50°C	



# DIGITAL INFRARED RADIATION THERMOMETERS

## Digital infrared radiation thermometers

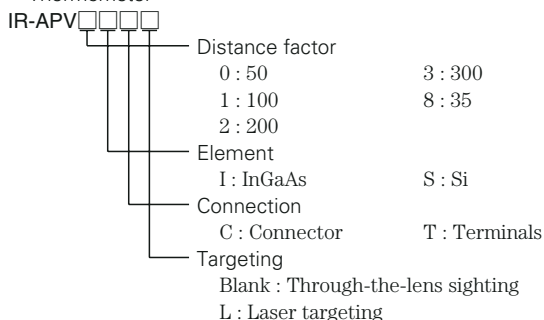
### IR-APV



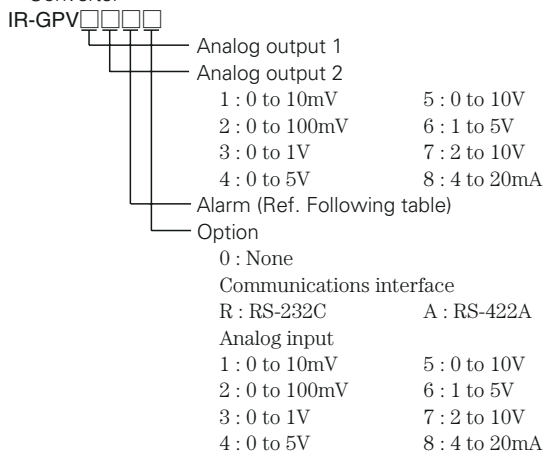
IR-APV series are easy-to-use radiation thermometers with improving processing function and speed in addition to the features of the IR-A series.

#### Model

##### • Thermometer



##### • Converter



#### Alarm output

Model	Alarm 1	Alarm 2	Alarm 3
1	Contact	Contact	Contact
2	Contact	Contact	Open collector
3	Contact	Open collector	Contact
4	Contact	Open collector	Open collector
5	Open collector	Contact	Contact
6	Open collector	Contact	Open collector
7	Open collector	Open collector	Contact
8	Open collector	Open collector	Open collector

#### Standard temperature range

Element	Spectral response	Temperature range (distance factor)
InGaAs	1.55 $\mu$ m	200 ~ 900°C (100) 250 ~ 1100°C (100, 200) 300 ~ 1300°C (100, 200, 300)
Si	0.96 $\mu$ m	500 ~ 1200°C (35, 50) 600 ~ 1700°C (35, 50, 100, 200) 600 ~ 3000°C (35, 50, 100, 200) 800 ~ 3500°C (35, 50, 100, 200, 300)

Temperature ranges except above can be offered upon request.

#### General specifications

- Thermometer
  - Measuring system : Narrow-band radiation thermometer
  - Element : InGaAs or Si
  - Spectral response : InGaAs...1.55  $\mu$  m, Si...0.96  $\mu$  m
  - Measuring range : InGaAs...Higher than 200°C  
Si...Higher than 500°C  
(Refer to the standard temperature range.)
  - Accuracy ratings : Lower than 500°C... $\pm 3^\circ\text{C}$   
500 to 1000°C... $\pm 5^\circ\text{C}$   
1000 to 1500°C... $\pm 0.5\%$  of readings  
1500 to 2000°C... $\pm 1.0\%$  of readings  
Higher than 2000°C... $\pm 2.0\%$  of readings  
(at  $\epsilon \approx 1.0$  and reference operating conditions)
  - Reproducibility : Within 1°C
  - Temperature drift : 0.2% of readings/°C
  - Resolution : About 4°C
  - Response time : 40ms (95% response)...Converter output
  - Distance factor : 35, 50, 100, 200 or 300
  - Lens focusing distance : 0.5m to infinity
  - Spot size : Measuring distance/distance factor
  - Lens aperture :  $\phi$  30mm
  - Targeting : Through-the-lens sighting or laser targeting
  - Working temperature : 0 to 50°C
  - Connection : Terminals or connector
    - Terminals only for hard protective case
  - Cable length : Up to 400m (exclusive cable)
  - Housing : Die-cast aluminum
  - Mounting : On tripod, universal head or in protective case
  - Weight : About 1.9kg
- Converter
  - Emissivity compensation : 1.000 to 0.100
  - Signal modulation mode : Real, peak, delay, and valley
    - Modulation degree...0.0 to 99.9s
    - Hold...Output hold by remote contact signal
    - Modulation cancellation...
      - Shifts to real by remote contact signal

#### Display : Back-lit LCD

- Measured temp, status and parameter
- Output signal : 4 to 20mADC (load resistance : lower than 550  $\Omega$ )  
0 to 10mVDC (output resistance : 10  $\Omega$ )  
0 to 100mVDC, 0 to 1VDC, 0 to 5VDC, 1 to 5VDC,  
0 to 10VDC, 2 to 10VDC  
2 outputs from the above are to be specified.  
Independent isolated output
- Output scaling : -100 to 3999°C (1°C increment)
- Output update cycle : 10ms
- Alarm output : 3 points (setting 0.1°C increment)  
Contact (1a) or open collector, to be specified
- External analog input : Emissivity setting by external signal (option)  
4 to 20mADC, 0 to 10mVDC, 0 to 100mVDC  
0 to 1VDC, 0 to 5VDC, 1 to 5VDC, 0 to 10VDC  
2 to 10VDC

Communications interface : RS-232C or RS-422A, to be specified

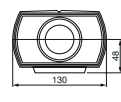
Power supply : 85 to 264VAC 50/60Hz

Power consumption : About 43VA

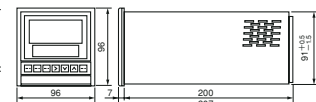
Weight : About 1.2kg

#### Dimensions

##### • Thermometer



##### • Converter

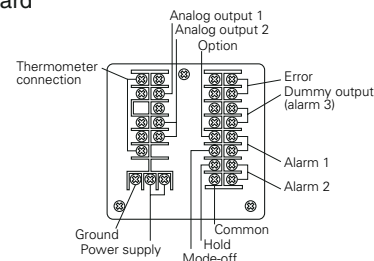


##### • Panel cutout



Unit : mm

#### Terminal board





# HANDHELD TYPE RADIATION THERMOMETERS

## Handheld type digital radiation thermometers

### IR-AH



IR-AH series are handheld digital thermometers with easy-to-read internal and external digital displays, and measure the temperature of -50 to 3000°C.

#### Model

IR-AH		Model
	T	For low temperature
	S	For medium/high temperature
	U	For high temperature
		Analog output (option)
	0	None
	2	0 to 1VDC

#### Close-up lens

The lenses are used for the measuring distance shorter than 0.5m.

Model	Measuring distance	Spot size	Thermometer
IR-VHD13	100~130mm	φ 1.0~1.3mm	IR-AHS
IR-VHD18	130~180mm	φ 1.3~1.8mm	IR-AHS
IR-VHD29	180~290mm	φ 1.8~2.9mm φ 0.7~1.2mm	IR-AHS IR-AHU
IR-VHD54	250~540mm	φ 2.5~5.4mm φ 1.0~2.2mm	IR-AHS IR-AHU

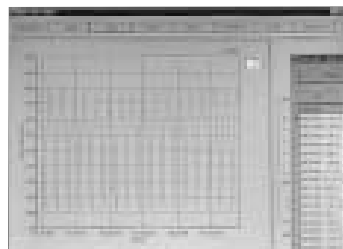
#### General specifications

Model	IR-AHS	IR-AHU	IR-AHT
Measuring system	Narrow-band radiation thermometer		Wide-band radiation thermometer
Detecting element	Si		Thermopile
Spectral response	0.96 μm	0.65 μm	8 to 13 μm
Measuring range	600 to 3000°C	900 to 3000°C	-50 to 1000°C
Accuracy ratings*	Lower than 1500°C : ±0.5% of readings ±1 digit 1500°C to 2000°C : ±1.0% of readings ±1 digit Higher than 2000°C : ±2.0% of readings ±1 digit		Lower than 200°C : ±2°C ±1 digit Higher than 200°C : ±1.0% of readings ±1 digit
Reproducibility	1°C ±1digit		
Stability	1) Temperature drift : 0.015% of readings/°C 2) Stability : ±5°C under EMC test environment		1) Temperature drift : Lower than 300°C...0.15°C/°C 300 to 700°C...0.05% of readings/°C Higher than 700°C...0.025% of readings/°C 2) Stability : ±15°C under EMC test environment
Resolution	1°C		1°C (higher than 50°C)
Response time	0.5s		1s
Emissivity compensation	1.00 to 0.10 (0.01 increment)		
Signal modulation	Modulation : Real, peak, delay and valley Modulation degree : 0 to 99s (1s increment) Peak hold, Valley hold, Hold with the measuring switch turned off		
Display	LCD digital 4 digits, displayed in the viewfinder and on the panel board		
Data storage function	Max 1000 data		
Users' calibration	Calibration at zero and span		
Output signal	Digital transmission (RS-232C), Analog output (0 to 1VDC, option), with a cord		
Optics	Focusable lens type		Focusable cassegrain type
Distance factor	100	250	40
Measuring distance	0.5m to infinity		0.7m to infinity
Targeting	Through-the-lens sighting		
Lens aperture	φ 30mm		φ 40mm
Other functions	Auto-power-off, continuous measurement, °C/°F selection, battery check, high/low alarms		
Working temperature	0 to 50°C		
Power supply	AA (UM-3) battery, 4 pieces (about 20 hours continuous running)		
Housing	ABS resin		
Weight	About 700g (thermometer only)		About 850g (thermometer only)
CE-marking	EN55011 Group 1 Class B EN50082-1		

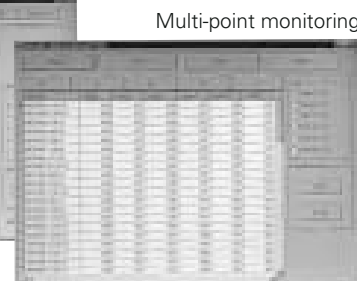
\* At ε ≈ 1.0 and reference operating conditions

## Data logging software package

### IR-VXH2E



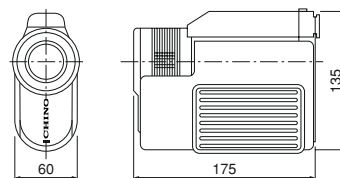
Real-time trend



Multi-point monitoring

Three kinds of real-time trend mode, multi-point monitoring mode by utilizing memory and 1-point historical trend mode are available. Graph display, report creation and data storage can be easily executed. Exporting of measured data to worksheets applications is also available.

#### Dimensions



Unit : mm



NEW

## Handheld type radiation thermometers IR-H



IR-H series are small and lightweight handheld digital thermometers. Small objects can be measure by the built-in through-the-lens sighting system. K type thermocouples can be connected for low temperature measurement or for emissivity compensation.

### Model

IR-H

Model

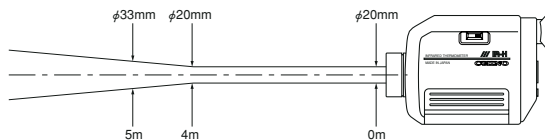
I : Single-color, for medium temperature

S : Single-color, for high temperature

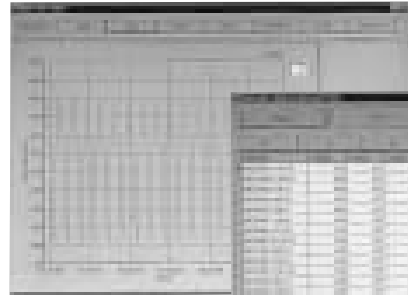
QH : High functional type

(Two color type + single-color wide-range type)

### Spot size/measuring distance

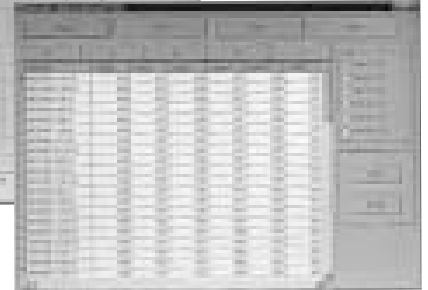


## Data logging software package IR-VXG1E



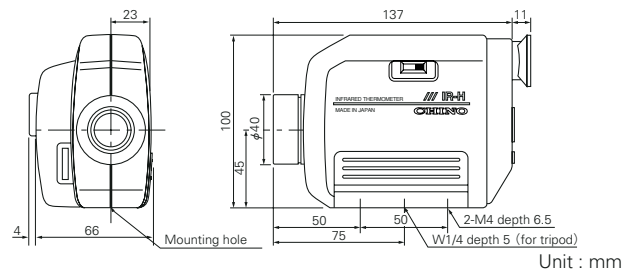
Real-time trend

Multi-point monitoring



Three kinds of real-time trend mode, multi-point monitoring mode by utilizing memory and 1-point historical trend mode are available. Graph display, report creation and data storage can be easily executed. Exporting of measured data to worksheets applications is also available.

### Dimensions



Unit : mm

### General specifications

Model		Single-color, for medium temperature	Single-color, for high temperature	High functional type (Two-color type + single-color wide-range type)
		IR-HI	IR-HS	IR-HQH
Measuring system		Narrow-band radiation thermometer		
Detecting element		InGaAs	Si	Si/InGaAs
Spectral response		1.55 μm	0.9 μm	0.9/1.55 μm
Measuring range		300 to 1000℃	600 to 2000℃	600 to 2000℃ (two-color)/400 to 3000℃ (single-color) (Changing by key)
Accuracy ratings		±6℃	Lower than 1000℃ : ±6℃, 1000 to 1500℃ : ±0.6% of readings 1500 to 2000℃ : ±1.2% of readings, Higher than 2000℃ : ±2.4% of readings (IR-HQH only)	
Reproducibility		Within ±1℃		
Stability	Temperature drift	0.2℃/℃	Lower than 1000℃ : 0.2℃/℃ Higher than 1000℃ : 0.02%/℃ of readings	
	Stability in EMC test environment	±3℃		
		±50℃ [(at the connection with connection code for RS-232C, AC adapter or thermocouple C510-0(K))		
Resolution		1℃		
Response time		0.2s (95% response)		
Emissivity (ratio) compensation		0.100 to 1.900		
Signal processing		Maximum value, minimum value, average value		
Signal modulation		Peak, delay		
Display		LCD digital 4 digits, Displayed in the viewfinder and on the panel board		
Data storage function		Maximum 500 data		
Communications		RS-232C		
Optics		Fixed focus type		
Spot size/measuring distance		φ 20/4000mm (Refer to the spot size/measuring distance.)		
Targeting		Through-the-lens sighting		
Lens aperture		φ 20mm		
Thermocouple input		K thermocouple…—50 to 800℃, Accuracy…±2℃ (at 23 ± 5℃)		
Other Functions		Auto-power-off, Automatic back-lit display, Continuous measurement, ℃/°F selection, Battery check, High / low alarms		
Working Temperature		0 to 50℃		
Power Supply		AA (UM-3) battery, 2 pieces (50 hours by alkaline battery) or AC adapter (Separate purchase required)		
Housing, color		ABS resin, gray		
Weight		About 350g (thermometer only)		
CE-marking		EN61326 Emission : Class B, Immunity : Table 1 - minimum immunity requirement		

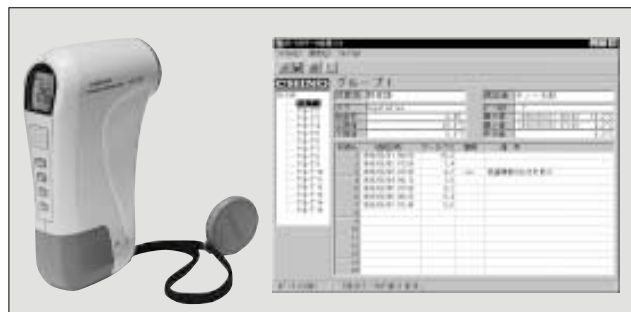
\*At  $\epsilon \approx 1.0$  and reference operating conditions



# HANDHELD TYPE RADIATION THERMOMETERS

## Handheld type radiation thermometers

### IR-TA



IR-TA series are small and lightweight handheld digital thermometers for the temperature measurement of -40 to 500°C.

The thermometer with data storage function built-in is available for data management by a personal computer.

#### Model

IR-TA□

Model

Blank : Standard type

F : Universal type

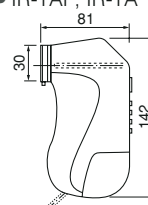
P : With data storage function

#### • Data logging software package

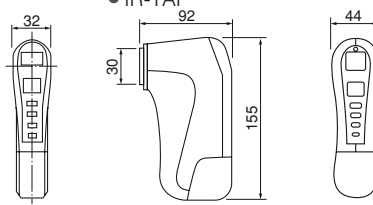
MP9010

#### ■ Dimensions

##### • IR-TAF, IR-TA



##### • IR-TAP

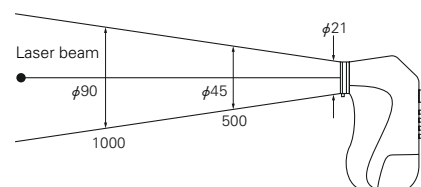


Unit : mm

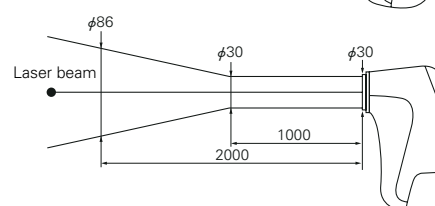
#### ■ Spot size/measuring distance

##### • IR-TAF, IR-TA

\* IR-TAF is without laser targeting.



##### • IR-TAP



Unit : mm

#### ■ General specifications

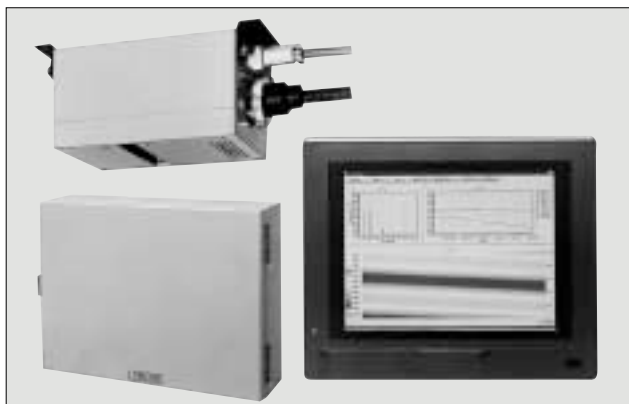
Model	Universal type		Standard type	<div>NEW</div> With storage function
	IR-TAF		IR-TA	IR-TAP
Measuring system	Wide-band radiation thermometer			
Detecting element	Thermopile			
Spectral response	8 to 14 μm			
Measuring range	−30 to 350℃		−40 to 500℃	
Accuracy ratings	±1% of readings or ±2℃, whichever is larger, except ±3℃ for −30 to 0℃		±1% of readings or ±2℃, whichever is larger, except ±3℃ for −30 to 0℃ and ±5℃ under −30℃	
Reproducibility	Within ±1℃			
Response time	0.8s (90% response)			
Spot size	Refer to the spot size/measuring distance.			
Targeting	————		Center spot by laser	
Beam diameter	————		About 5mm (at distance of 1m)	
Beam output	————		Less than 1mW (670nm), JIS Class 2	
Display	LCD 3 digits			
Display resolution	0.1℃ at -19.9 to 99.9℃, 1℃ at higher than 100℃ or lower than -20℃			
Display update cycle	About 0.25s			
Display contents	Measured value, max value, min value, unit, measuring condition, emissivity selection, battery shortage		Measured value, max value, min value, measured value hold, emissivity set value, alarm setpoint, battery shortage	Measured value, stored data, calculated value in stored data, unit (℃ or °F), year/month/day/hour/min, emissivity set value, alarm setpoint, battery shortage
Auto-power-off	Power-off after 30 seconds of key operation			
Data storage	————		————	Maximum 150 data Data group 15
Data calculation	————		————	Max value, min value, (max - min) value and average value in each group
Alarm	————		High alarm (sound) Low alarm (option)	High/low alarms in each group
Emissivity compensation	DARK···0.95 BRIGHT···0.80 STD···1.00		DARK···0.95 BRIGHT···0.80 FREE···0.30 to 1.90 (default : 1.00, 0.01 increment)	
Data output	————		————	RS-232C compatible
Working Temperature	0 to 50℃			
Working humidity	Lower than 90%RH (no dew condensation)			
Storage temperature	−20 to 55℃			
Power Supply	AA (UM-3) alkaline battery, 2 pieces			
Battery life	About 50 hours continuous running			
Weight	About 160g		About 180g	About 220g
CE-marking	————		EN55011 Group 1 Class B EN50082-1	————



# SCANNING RADIATION THERMOMETERS

NEW

## Fiber optic scanning radiation thermometer IR-ES



IR-ES series are for measurement of width-direction temperature pattern and are applicable to temperature measurements of moving objects. A system is consisted of a scanning unit, a main unit, and a display processing unit for operation and graphic display.

### Model

#### • Main unit

IR-EF□

Element

I : InGaAs

S : Si

#### • Scanning unit

IR-ESF12

#### • Display processing unit

IR-EP□5

OS

W : Windows95

N : WindowsNT

#### • Fiber optic cable

IR-ZFN□□

Fiber length

04 : 4m (standard)

(Specify it in 4 to 20m.)

### Standard temperature range

Element	InGaAs	Si
Measuring range	300~750℃ 400~1100℃ 350~900℃ 500~1300℃	600~1100℃ 800~1600℃ 700~1300℃ 900~2000℃

### General specifications

#### • Main unit

Measuring system : Single-color type

Element : InGaAs or Si

Measuring range : InGaAs...300 to 1300℃

Si...600 to 2000℃

(Refer to the standard temperature range.)

Accuracy ratings : InGaAs Lower than 1000℃...±5℃

Higher than 1000℃...±0.5% of readings

Si Lower than 800℃...±4℃

800 to 1500℃...±0.5% of readings

Higher than 1500℃...±1.0% of readings

(at  $\epsilon \approx 1.0$  and reference operating conditions)

Fiber optic cable : IR-ZFN04 with metal protective tube,

4m standard (up to 20m)

Output to display processing unit :

Temperature signal...4 to 20mADC

Scanning synchronized signal...Open collector

Connection to display processing unit : Exclusive cable

Rated power supply : 100 to 120VAC or 200 to 240VAC,

to be specified, 50/60Hz

Weight : About 7.2kg

#### • Scanning unit

Scanning system : Scanning by rotating mirror

Scanning angle : 90°

Scanning speed : About 5 scans/second

Spot size/measuring distance : Standard  $\phi$  40/400mm

(using lens assembly IR-ZFL12)

Connection to main unit : Fiber optics and exclusive cable

Rated power supply : 24VDC (supplied from main unit)

Weight : About 1.3kg

#### • Display processing unit

OS : Windows95 or WindowsNT4.0

Resolution : 800×600 pixel

Display : Thermal image display in each mode of pattern, trend, and color

Output signal : 0 to 5VDC (no isolated)

Output point : At sampling mode

① 7-place points + 1 peak point or

② 3 zone peak points

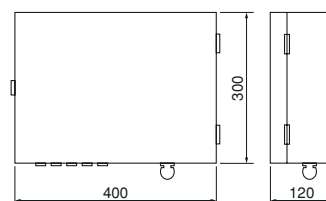
Software : Standard software built-in for fiber optic radiation thermometer

Power supply : 100 to 240VAC, 50/60Hz

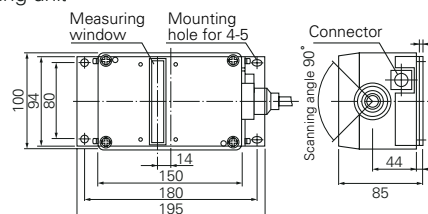
Weight : About 8.5kg

### Dimensions

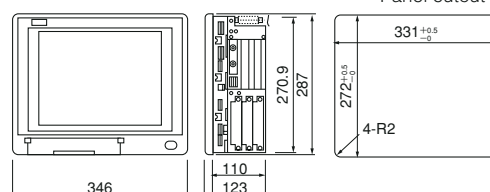
#### • Main unit



#### • Scanning unit



#### • Display processing unit



Unit : mm



# SCANNING RADIATION THERMOMETERS

NEW

## Scanning radiation thermometers for low temperature IR-ESC



IR-ESC series are low temperature scanning thermometers, with the wide measuring range of 100 to 600°C, for width-direction temperature pattern of moving or rotating objects. A system is consisted of a scanning unit and a display processing unit with the exclusive software built-in for operation and graphic display.

### Model

#### ● Scanning unit

IR-ESCF2

Scanning speed

- 1 : 5 scans/second
- 2 : 10 scans/second

Option

- N : None
- F : Through-the-lens type
- L : Laser targeting type

#### ● Display processing unit

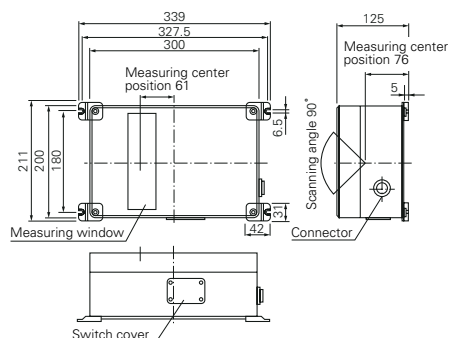
IR-EP5

OS

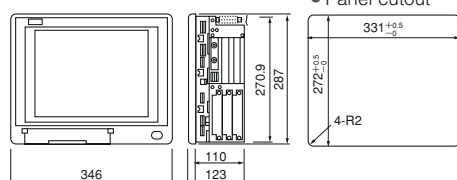
- W : Windows95
- N : WindowsNT

### Dimensions

#### ● Scanning unit



#### ● Display processing unit



Unit : mm

### General specifications

#### ● Scanning unit

Scanning system : Scanning by rotating mirror

Element : Cooling type PbS

Scanning angle : 90°

Scanning speed : About 5 scans/second or 10 scans/second\* to be specified

Measuring system : Narrow-band radiation thermometer

Measuring range : 100 to 600°C

Accuracy ratings : Less than 400°C...±4°C

More than 400°C...±1% of readings

(at  $\epsilon \div 1.0$  and reference operating conditions)

Resolution : Less than 400°C...3°C More than 400°C...2°C

Emissivity compensation : 1.0 to 0.2

Measuring distance : 0.5m to infinity

Instant view field (mm<sup>2</sup>) : Measuring distance (mm)/Distance factor 150

Response time : 0.5ms (95% response)

Targeting : Through-the-lens sighting or laser targeting (option)

Laser on/off by switch

(Laser : less than 1mW, 645nm, Class 2)

Output signal : Temperature signal...4 to 20mADC

Peak temperature...4 to 20mADC

Scanning angle...Open collector

(max load voltage 35VDC, max load current 10mADC)

Emissivity remote setting : 4 to 20mADC

Working temperature : 0 to 50°C

Rated power supply : 100 to 240VAC, 50/60Hz

Allowable voltage fluctuation : 85 to 110% of rated value

Power consumption : About 40VA

Connection : Connector

Cable length : Up to 200m (exclusive cable)

Housing : Aluminum, Gray

Weight : About 6.5kg

\* For the scanning speed of 10 scans/second, ask CHINO.

#### ● Display processing unit

OS : Windows95 or WindowsNT4.0, to be specified

Resolution : 800×600 pixel

Display : Thermal image display in each mode of pattern, trend, and color

Input signal : 0 to 5VDC (250Ω resistor is added to 4 to 20mADC from scanning unit.)

Output signal : 0 to 5VDC (no isolated)

Output point : At sampling mode ① 7-place points+1 peak point or ② 3 zone peak points

Software : Thermal image software built-in

Power supply : 100 to 240VAC, 50/60Hz

Weight : About 8.5kg

### Kiln-shell software specifications

Function : Kiln shell hot spot monitoring (zone peak temperature, graph, thermal image display, historical display, report output)

Screen update cycle : Every 2 rotations of kiln

Hot spot detection : Detecting of hot spot at maximum temperature of each zone (with rate-of-change detecting function)

Maximum scanning : 200 scans/1 rotation of kiln

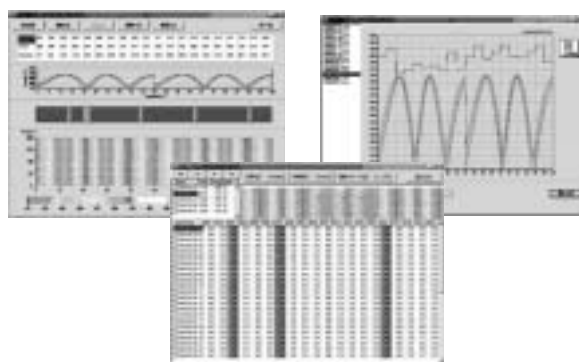
Thermal image : 400 colors

Screen display : Data display, operation button, operating status

Setting : Alarm setting

Data storage : Zone max/min temperature per hour, max temperature of each zone per day, extended thermal image at max temperature detected per day, max/min/average temperature pattern per hour, extended thermal image per hour (exclusive file space of about 1GB in a year)

Historical/analysis : Recall/display of data base and report printout in historical mode





## Scanning radiation thermometers IR-E



IR-E series are scanning radiation thermometers for non-contact measurement of 1-axis-direction temperature pattern and are applicable to wide applications of pattern measurement from steel plates in hot rolling mills to film sheets in film manufacturing processes.

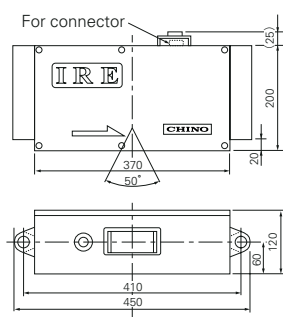
Model	
IR-E	F
Distance factor (a×b)	0 : 50 (50×50)      1 : 100 (100×100)
Connection	T : Terminals      C : Connector

### General specifications

Scanning system : Scanning by rotating mirror  
 Element : Cooling type PbSe  
 Spectral response :  $4.0\ \mu\text{m}$   
 Scanning angle :  $50^\circ$   
 Scanning speed : 5, 10, 30, 50 scans/second (to be specified)  
 Measuring system : Single-color radiation thermometer  
 Accuracy ratings :  $\pm 4^\circ\text{C}$   
 Resolution :  $2^\circ\text{C}$   
 Measuring distance : 0.5 to 10m  
 Instant view field (mm $^2$ ) : Measuring distance (mm)/distance factor  
 Response time:  
      $200\ \mu\text{s}$  (scanning speed : 50 scans, distance factor : 50)  
     2ms (scanning speed : 5 scans, distance factor : 50)  
     (95% response)  
 Output signal : 0 to 1mVDC and scanning synchronization signal  
 Load resistance : 0 to 5k $\Omega$   
 Working temperature : 0 to  $50^\circ\text{C}$   
     0 to  $120^\circ\text{C}$  (using protective case with water cooling)  
 Power supply : 100VAC, 50/60Hz  
 Allowable voltage fluctuation : 90 to 110% of rated value  
 Power consumption : About 40VA  
 Allowable vibration : Less than  $29.4\text{m/s}^2$  (3G) continuously  
 Connection : Terminals or connector  
 Cable length : Up to 200m (exclusive cable)  
 Housing : Aluminum casting  
 Weight : About 12kg

Standard temperature range (distance factor)	
50 ~ $300^\circ\text{C}$ (50, 100)	100 ~ $400^\circ\text{C}$ (50, 100)

### Dimensions



Unit : mm

## Scanning radiation thermometers IR-N



IR-N series are scanning radiation thermometers for non-contact measurement of 1-axis-direction temperature pattern using CCD linear array element.

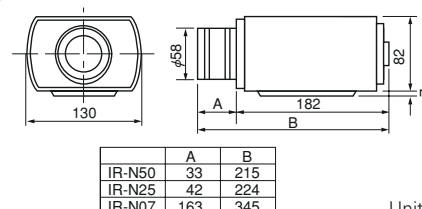
Model	
IR-N	A
Scanning angle	50 : $50^\circ$ 25 : $25^\circ$ 07 : $7^\circ$
Connection	T : Terminals    C : Connector

Standard temperature range			
500 ~ $750^\circ\text{C}$	550 ~ $850^\circ\text{C}$	600 ~ $950^\circ\text{C}$	650 ~ $1050^\circ\text{C}$
700 ~ $1100^\circ\text{C}$	800 ~ $1300^\circ\text{C}$	900 ~ $1500^\circ\text{C}$	1000 ~ $1600^\circ\text{C}$

### General specifications

Scanning system : Electronic scanning by one-dimensional solid image element  
 Scanning angle :  $50^\circ$ ,  $25^\circ$ ,  $7^\circ$  (to be specified)  
 Scanning speed : 90 scans/second  
 Element : CCD silicon linear array  
 Picture element : 2048 elements  
 Spectral response :  $0.9\ \mu\text{m}$   
 Measuring range : 500 to  $1600^\circ\text{C}$   
 Accuracy ratings : Lower than  $800^\circ\text{C}$ ...  $\pm 1.0\%$  of readings  
     800 to  $1500^\circ\text{C}$ ...  $\pm 0.7\%$  of readings  
     Higher than  $1500^\circ\text{C}$ ...  $\pm 1.0\%$  of readings  
     (at  $\epsilon \approx 1.0$  and reference operating conditions)  
 Resolution :  $3^\circ\text{C}$  [at min temperature ( $T_{\text{min}}$ ) of measuring temperature range]  
      $1^\circ\text{C}$  (at  $T_{\text{min}} + 50^\circ\text{C}$ )  
 Measuring distance : 1 to 10m  
     (Calibration is executed by the length specified.)  
 Output signal :  
     • Intensity pattern signal (non-linear output to temperature, without emissivity compensation)  
     • Scanning synchronizing signal  
 Targeting : Through-the lens sighting  
 Working temperature : 0 to  $50^\circ\text{C}$   
     0 to  $120^\circ\text{C}$  (using protective case with water cooling)  
 Power supply : 25VDC (supplied from converter)  
 Allowable vibration : Less than  $29.4\text{m/s}^2$  (3G) continuously  
 Connection : Terminals or connector  
     Terminal connection only for using hard type protective case  
 Cable length : Up to 200m (exclusive cable)  
 Housing : Aluminum  
 Mounting : On tripod, universal head or in protective case  
 Weight : About 3kg

### Dimensions



Unit : mm



# INFRARED RADIATION THERMOMETERS



## CAUTION

- Please do not aim or direct laser toward faces.
- On measurement of targets like as glossy metal, be careful with influences by the reflection from it.

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