

IR-A SERIES DIGITAL INFRARED RADIATION THERMOMETER



■ MODEL IR-A

The Digital Pyro Series infrared radiation thermometers cover a wide temperature range from a low temperature range of (-)50°C to a high temperature range of 3500°C. These high-performance instruments ensure highly precise and highly reliable measurements. Thus, these instruments are applicable to wide fields ranging from iron & steel and ceramics fields to high technology fields of new materials and semiconductors, plus test and research fields.

■ FEATURES

- Standard functions conforming to the systemized radiation thermometry
- Wide measuring range and optional scaling of scale range
- Interchangeability of detectors and converters
- Compact and lightweight
- Sharp moving focus type optical system
- Highly reliable as an on-line sensor
- Various accessories



MODEL IR-AL



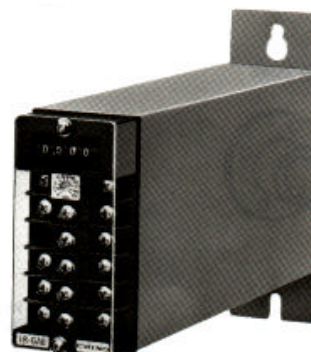
MODEL IR-GAG



MODEL IR-GAP



MODEL IR-GAW

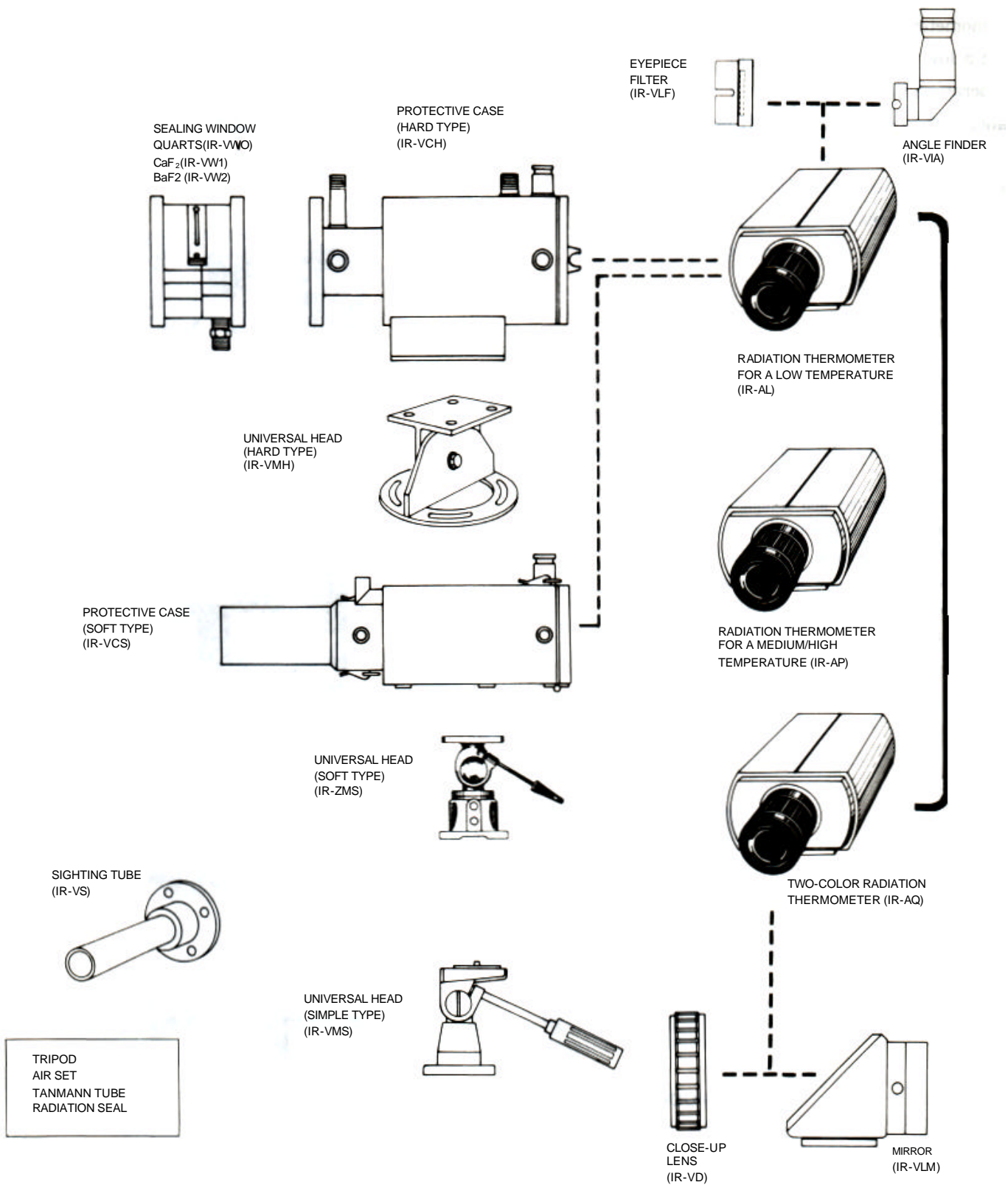


MODEL IR-GAB

■ CONFIGURATION

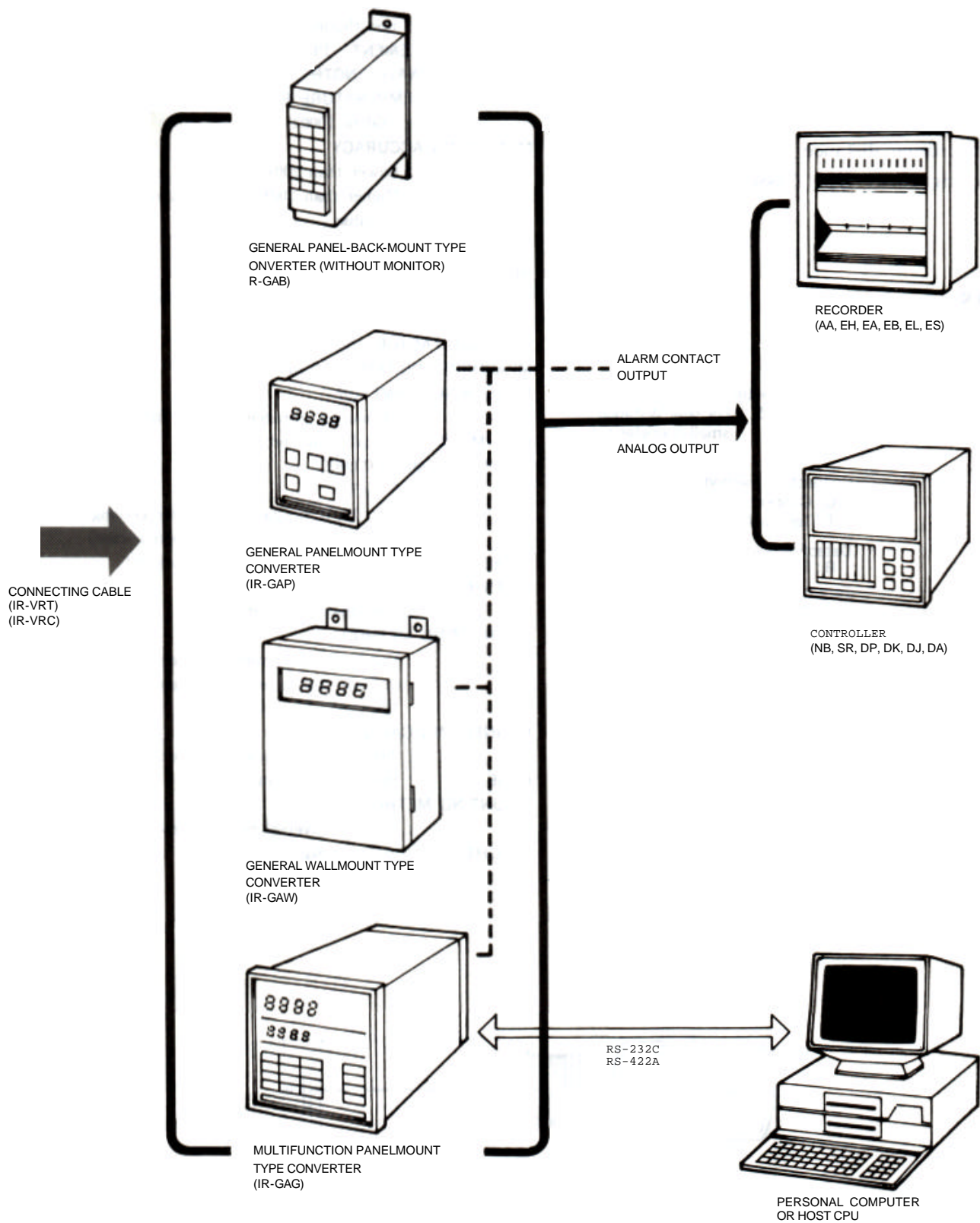
● Exclusive Accessories

● Detectors



• Converters

• Combined Instruments



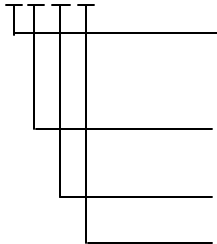
RADIATION THERMOMETER FOR A LOW TEMPERATURE

■ MODEL IR-AL

The Model IR-AL is a wide span type radiation thermometer employing a pyroelectric element as a detecting element, and can measure a wide temperature range of (-)50°C to 1000°C. Furthermore, it can measure a temperature at an optional measuring distance, by the employment of the moving focus type Cassegrainian optical system.

■ MODELS

IR-AL□□ B □



Distance factor
0:50, 5:25, 8:For near distance
small-diameter substances

Connecting method
C: Connector connection
T: Terminal connection

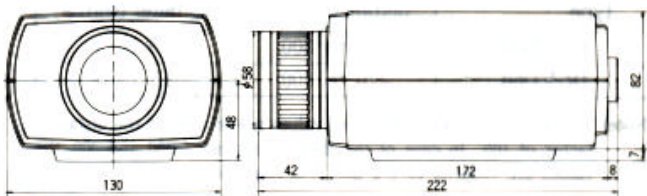
Detecting element
B: Pyro-electric element

Target size for near distance small-diameter type (for semiconductors)
1: $\phi 2/100\text{mm}$
2: $\phi \sim 4/200\text{mm}$

■ STANDARD MEASURING RANGE

Standard measuring range	(-) 50 to 1000°C
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■ EXTERNAL DIMENSIONS



Unit : mm

■ GENERAL SPECIFICATIONS

MEASURING SYSTEM

: Self-compensating type wide range radiation thermometer

DETECTING ELEMENT : PE (pyroelectric element)

MEASURING WAVELENGTH : 8 to 13 μm

MEASURING TEMPERATURE RANGE

: (-)50 to 1000°C

MEASURING ACCURACY

: Lower than 200°C — $\pm 2^\circ\text{C}$

Higher than 200°C — $\pm 1\%$ of measured value

(provided $\epsilon \cong 1.0$)

RESOLUTION : 1°C

RESPONSE TIME : About 0.5 sec (95% response)

TRANSMISSION SIGNAL : Digital signal

DISTANCE FACTOR : 25 or 50

MEASURING DISTANCE : 0.5m to ∞

MEASURING DIAMETER

: Measuring distance/distance factor

COLLIMATION : Visual finder provided

AMBIENT TEMPERATURE

: 0 to. 50°C

: 0 to 150°C (in case that water cooling system is used with a protective case)

POWER SUPPLY : 25V DC, 5VA (from converter)

ALLOWABLE VIBRATION

: Less than 3G (continuous)

CONNECTING METHOD

: Connector or terminal connection

(In case that a protective case is used, terminal connection is only available.)

CONNECTING CABLE LENGTH

: 200m max. (in case of the exclusive cable)

CASE : Diecast aluminum

MOUNTING METHOD

: Tripod, universal head or protective case

WEIGHT : About 1.9kg

RADIATION THERMOMETER FOR A MEDIUM/HIGH TEMPERATURE

MODEL IR-AP

The Model IR-AP is a monochromatic narrow wavelength band radiation thermometer employing PbSe, PbS, Ge, or Si as a detecting element, and can measure a medium/high temperature range of 100°C to 3500°C. Furthermore, it can measure accurately without any noticeable emissivity affection, by the employment of the wavelength division system which selects an optimum wavelength according to the measuring temperature range.

MODELS

IR-AP□□□□

Distance factor	0:50, 1:100, 2:200, 3:300
Connecting method	C: Connector connection T: Terminal connection
Detecting element	E: PbSe, P: PbS, G: Ge, S: Si
Code and detecting element by uses	EF: For films PbSe (3.43 ~m) Distance factor: 50, 100 Detecting element: PbSe
	EH: For flames PbSe (45pm) Distance factor: 50 Detecting element: PbSe
	ER: For intra-furnace substances Detecting element: PbSe (3.8pm) Distance factor: 50, 100
	PR: For intra-furnace substance Detecting element: PbS (2.2um) Distance factor: 50, 100, 200
	EG: For burner heating Detecting element: PbSe (3.8 ~i m) Distance factor: 50, 100

STANDARD MEASURING RANGE

Detecting element	PbSe	PbS	Ge	Si
Measuring wavelength (μm)	4	2	1.6	0.96
Measuring range (°C)	100 to 500 (50, 100) 200 to 800 (50, 100) 300 to 1100 (50, 100) 400 to 1300 (50, 100)	150 to 450 (50, 100) 200 to 600 (50, 100, 200, 300) 300 to 800 (50, 100, 200, 300) 400 to 1200 (50, 100, 200, 300)	300 to 900 (50) 400 to 1300 (50, 100) 500 to 1500 (50, 100, 200, 300)	500 to 1200 (50) 600 to 1700 (50, 100) 600 to 3000 (50, 1~ 200) 800 to 3500 (50, 11* 200, 00)

CLOSE-UP LENS

Used in case of the measurement at a measuring distance of nearer than 0.5m.

Close-up lens type	Measuring distance (mm)	Measuring diameter (mm φ)
IR-VD12	100 to 120	1 to 1.2
IR-VD15	115 to 150	1.15 to 1.5
IR-VD20	145 to 200	1.45 to 2
R-VD30	190 to 300	1.9 to 3
IR-VD60	270 to 600	2.7 to 6

Note) The above measuring diameter values are in case of the distance factor of 100. In case of the distance factor of 200 and 300, the values are reduced to 1/2 and 1/3, respectively.

GENERAL SPECIFICATIONS

MEASURING SYSTEM

: Self-compensating type narrow wavelength band radiation thermometer

DETECTING ELEMENT : PbSe, PbS, Ge or Si

MEASURING WAVELENGTH

: PbSe — 4μm Ge — 1.6μm
PbS — 2μm Si — 0.96μm

MEASURING TEMPERATURE RANGE

: 100 to 3500°C (refer to standard measuring range)

MEASURING ACCURACY

: PbSe, PbS and Ge element
Lower than 500°C — ± 3°C
500°C to 1000°C — ± 5°C
Higher than 1000°C — ± 0.5% of measured value

Si element

Lower than 1500°C — ± 0.5% of measured value
1500 to 2000°C — ± 1% of measured value
Higher than 2000°C — ± 2% of measured value

(provided ≧ 1.0)

RESOLUTION : PbSe and PbS element

Lower than 300°C — 2°C
Higher than 300°C — 1°C

Ge and Si element

Lower than 400°C — 1.5°C
Higher than 400°C — 1°C

RESPONSE TIME : About 0.2 sec (95% response)

TRANSMISSION SIGNAL : Digital signal

DISTANCE FACTOR : 50, 100, 200 or 300

MEASURING DISTANCE : 0.5m to ∞

MEASURING DIAMETER

: Measuring distance/distance factor

COLLIMATION : Visual finder provided

POWER SUPPLY : 25V DC, 5VA (from converter)

ALLOWABLE VIBRATION : Less than 3G

(continuous)

CONNECTING METHOD

: Connector or terminal connection
(In case that a protective case is used, terminal connection is only available.)

CONNECTING CABLE LENGTH

: 200m max. (in case of the exclusive cable)

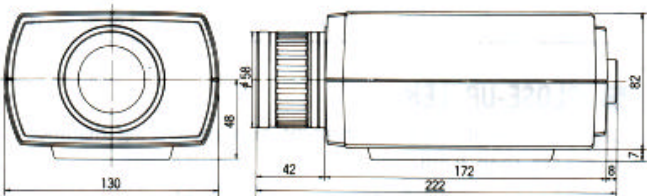
CASE : Diecast aluminum

MOUNTING METHOD

: Tripod, universal head or protective case

WEIGHT : About 1.9kg

EXTERNAL DIMENSIONS



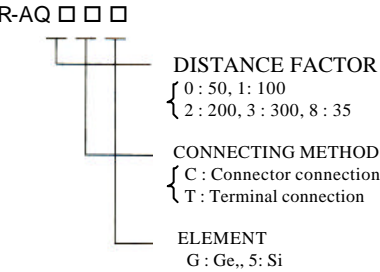
Unit : mm

TWO-COLOR THERMOMETER

MODEL IR-AQ

The Model IR-AQ is a two-color thermometer to obtain a temperature from the ratio of radiant energy in two wavelengths, and can measure a medium/high temperature range of 400°C to 3100°C. Inherently a two-color thermometer is not easily affected by emissivity and gray extinction. In addition, it has high reliability and high performance, by the employment of the digital ratio operating system and interference film filter.

MODELS



STANDARD MEASURING RANGE

Detecting element	Ge	Si
Measuring wavelength	1.5/1.65	0.8/0.97
Standard measuring range	400 to 1100 (35) 500 to 1300 (35, 50) 600 to 1500 (35, 50, 100)	700 to 1600 (50, 100) 800 to 1800 (50, 100, 200) 1000 to 3100 (50, 100, 200, 300)

CLOSE-UP LENS

Used in case of the measurement at a measuring distance of nearer than 0.5m.

Close-up lens type	Measuring distance (mm)	Measuring diameter (mm Ø)
IR-VD30	190 to 300	1.9 to 3
IR-VD60	270 to 600	2.7 to 6

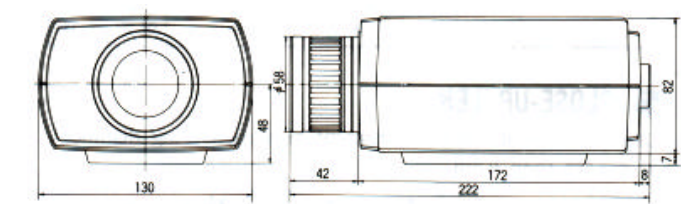
Note) The above measuring diameter values are in case of the distance factor of 100. In case of the distance factor of 200 and 300, the values are reduced to 1/2 and 1/3, respectively.

GENERAL SPECIFICATIONS

MEASURING SYSTEM	Two-wavelength AC ratio operating system two-color thermometer
DETECTING ELEMENT:	Ge or Si
MEASURING WAVELENGTH :	Ge— 1.5/1.65 μm Si 0.8/0.97 μm
MEASURING TEMPERATURE RANGE	400 to 3100°C (refer to standard measuring range)
MEASURING ACCURACY	400 to 700°C — ± 1% of measured value 700°C to 1500 — ±0.5% of measured value 1500 to 2000°C ± 1% of measured value Higher than 2000°C ±2 % of measured value (provided ε≧ 1.0)

RESOLUTION :	2°C
RESPONSE TIME :	About 0.3 sec (95% response)
TRANSMISSION SIGNAL :	Digital signal
DISTANCE FACTOR :	35, 50, 100, 200 or 300
MEASURING DISTANCE:	0.5m to ∞
MEASURING DIAMETER	Measuring distance/distance factor
COLLIMATION :	Visual finder provided
POWER SUPPLY :	25V DC, 5VA (From converter)
ALLOWABLE VIBRATION	Less than 3G (continuous)
CONNECTING METHOD	Connector or terminal connection (In case that a protective case is used, terminal connection is only available.)
CONNECTING CABLE LENGTH	200m max. (in case of the exclusive cable)
CASE :	Diecast aluminum
MOUNTING METHOD	Tripod, universal head or protective case
WEIGHT :	About 1.9kg

EXTERNAL DIMENSIONS



Unit: mm

CONVERTER

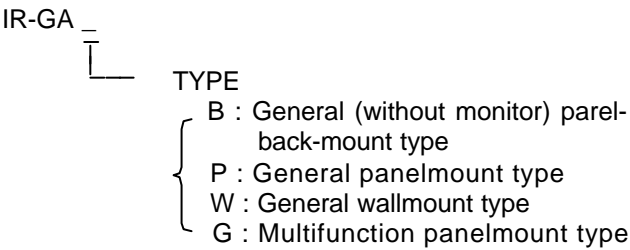
MODEL IR-GA

The Model IR-GA is a microprocessor based highly accurate temperature converter, and outputs specified signals after emissivity (ratio) compensation, linearizing, and signal modulation of temperature signals from the radiation thermometer detector. The following three types are available according to the uses.

1. General type (without a monitor display)
Popular type with the basic functions such as emissivity (ratio) compensation, linearizing, and signal modulation (DELAY, HOLD only)
2. General type
General type with the above basic functions plus monitor display, high/low limits alarm, signal modulation (PEAK, VALLEY) functions.
3. Multifunction type
In addition to the functions of the general type, it has
 - Optional output scaling
 - Section processing
 - Emissivity program
 - Reflection compensation operation
 - 2-input selector
 - Emissivity compensationfunctions. In addition, it can communicate with a computer through RS-232C or RS-422A as an optional function.

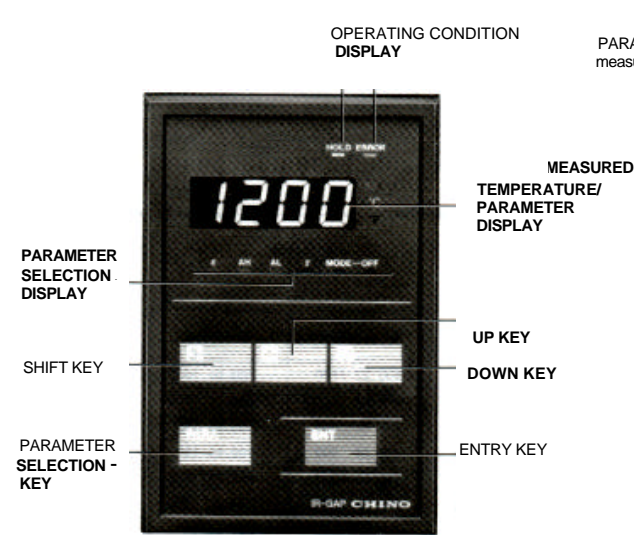
The Model IR-GA can be combined with any detectors regardless of the type of detectors, temperature range. It does not need any recalibration when changing the detector model combined, owing to its interchangeability. (only in case of the detector with standard specifications, except Model IR-GAB)

MODELS

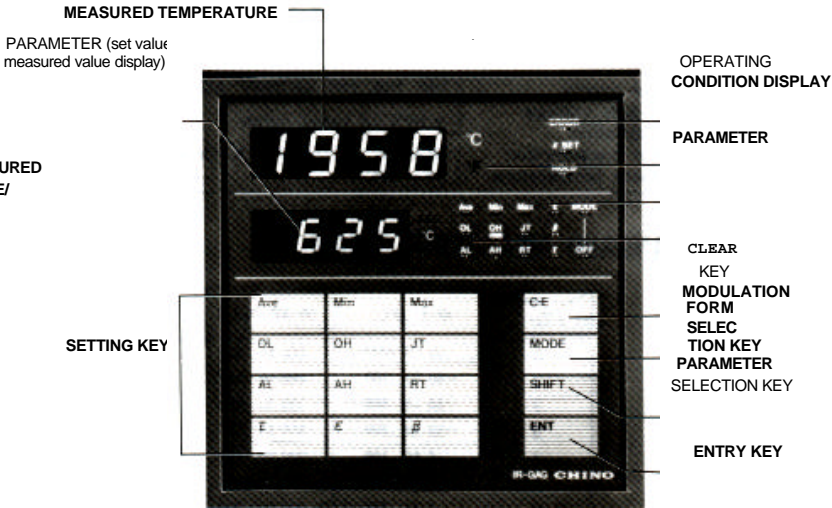


NAME AND FUNCTION OF EACH PART

- General type (MODEL IR-GAP)



- Multifunction type (MODEL IR-GAG)



MODEL IR-GA

■ GENERAL SPECIFICATIONS

	General panel-back-mount type (MODEL IR-GAB)	General panelmount type (MODEL IR-GAP) General wallmount type (MODEL IR-GAW)	Multifunction panelmount type (MODEL IR-GAG)
Emissivity compensation (emissivity ratio compensation) ication	c 0~100 to 1~000 (er =0.800 to 1.200) Digital switch setting	c 0100 to 1~000 (er =0.800 to L200) Shift key switch setting	e 0100 to 1~000 (er 0.800 to 1.200) Ten-key switch setting
Modulator .Signal modulation form . Degree of modula- tion . Hold . Modulation cancella-tion	DELAY : trace of average values (smoothing) 0 to 99sec (63%) Volume setting Output hold by external contact.	REAL : original signal PEAK : trace of maximum values DELAY : trace of average values 0 to 99sec (63%) 10 to 10sec step) Output hold by external contact Shift to REAL by external contact (smoothing) VALLEY: trace of minimum values 1 10 to 99sec (10sec step) Shift key switch setting	REAL : original signal PEAK : trace of maximum values DELAY : trace of average values 0 to 99sec (63%) 10 to 10sec (Olsec step) Output hold by external contact Shift to REAL by external contact (smoothing) VALLEY : trace of minimum values 1 10 to 99sec (LOsec step) Ten-key switch setting
Display		LED, 4 digits (red) Measured temperature and para- Switch meter Character height : 15mm (wallmount_type—25mm) Selection display by shift key	LED, 4 digits (red) For parameter switches character length 10mm Selection display by ten-key
Output signal	4 to 20mA DC (load resistance —100) —less than 550 0) Isolation output 0 to 10mV DC (output resistance	4 to 20mA DC (load resistance—less than 550 0 0 to 10mV DC (output resistance—10 0) Independent isolation output	
Output scaling	refer to stndard measuring range	refer to standard measuring	1 °C /step (optional) for both zero and (ten-key switch setting)
Output renewing interval	0.1 sec		
Accuracy • Display Analog output	±0.2% of measuring range	± 0.1% of rdg± 1 digit ±0.2% of measuring range	
Alarm output		High/low limits independent setting Setting range : full scale Output terminal : H.C.L terminals (2 sets) Contact capacity : 100V AC, 1A (resistance load) Judgment: before modulation	
Self diagnosis	Disconnection of connecting cable, detector CPU error, chopper motor rotation error, detector temperature error: contact output 1 point (normally ON), with LED display		
Weight	About 2kg	Panelmount type : about 2kg About 2kgWallmount type : about 6kg	About 4.5kg
Power supply Allowable voltage fluctuation Power consumption Ambient temperature	100, 110, 200, or 220V AC, 50/60Hz ±10% of rated value IR-GAG : about 40VA, Others : about 30VA (including a detector) 0 to 50t		

■ STANDARD MEASURING RANGE

Detectors No. of Measuring range	IR-AL(PE)	IR-AP(PbSe)	IR-AP(PbS)	IP-AP(Ge)	IR-AP(Si)	IR-AQ(Ge)	IR-AQ(Si)
0	-50 to 1000	100 to 500	150 to 450	300 to 900	500 to 1200	400 to 1100	700 to 1600
1	-50 to 100	100 to 300	150 to 300	300 to 500	500 to 800	400 to 700	700 to 1200
2	-50 to 200	100 to 400	150 to 350	300 to 700	500 to 1000	400 to 800	700 to 1400
3	-50 to 300	200 to 800	150 to 400	400 to 900	600 to 1200	400 to 900	700 to 1500
4	0 to 100	200 to 500	200 to 600	400 to 1300	600 to 1700	400 to 1000	800 to 1800
5	0 to 200	200 to 600	200 to 400	400 to 1000	600 to 1400	500 to 1300	800 to 1600
6	0 to 300	200 to 700	200 to 500	400 to 1200	600 to 1600	500 to 800	800 to 1400
7	0 to 400	300 to 1100	300 to 800	500 to 1300	700 to 1600	500 to 900	800 to 1200
8	0 to 600	300 to 500	300 to 500	500 to 1500	600 to 3000	500 to 1000	1000 to 3100
9	0 to 800	300 to 600	300 to600	500 to 1000	600 to 1800	500 to 1100	1000 to 2000
A	0 to 1000	300 to 800	300 to 700	500 to 1200	600 to 2000	500 to 1200	1000 to 2400
B	50 to 200	300 to 900	400 to 1200	600 to 1200	600 to 2500	600 to 1500	1000 to 3000
C	50 to 300	400 to 1300	400 to 700	600 to 1400	800 to 3500	600 to 900	1500 to 3000
D	50 to 500	400 to 700	400 to 800	800 to 1200	800 to 2000	600 to 1000	1500 to 2500
E	100 to 1000	400 to 900	400 to 900	800 to 1400	800 to 2500	600 to 1200	1500 to 3100
F	(-50 to 1000)	400 to 1100	400 to 1000	1000 to 1500	800 to 3000	600 to 1400	2000 to 3000

■ OPERATING FUNCTION (IR-GAG only)

1. Section processing
From the end of reset operation to the present time
 - . MAX (maximum) temperature
 - . MIN (minimum) temperature
 - . AVE (sequential average) temperature __ Maximum 50 hours are displayed in a section in AVE temperature measurement only.
 - * Reset : by the front key, external contact, or communications (option)
2. Emissivity (ratio) program
A program function to change the emissivity (ratio) set value according to measuring temperature
 - . Setpoint : 16 points
The emissivity set value changes linearly with reference to the setpoint temperature difference among these setpoints.
3. Reflection compensation (not provided with IR-AQ)
In addition to the detector output, this instrument receives a one-point temperature signal, and performs the following corrective operation, assuming that the one-point temperature signal is the reflection source temperature.
 - . Temperature input signal : 4 to 20mA DC linear (input scaling is as specified)
 - . Calculation formula

$$\frac{L(A) - \beta L(B)}{\epsilon} + \beta L(B)$$

L (A) : detector output
 L (B) : temperature input (radiation characteristic operation)
 ε : emissivity set value
 β : optical coefficient set value

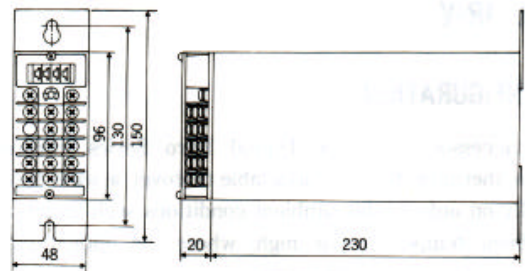
If the heat radiation energy from a surrounding substance is considerably introduced onto the measuring face and it is not negligible, like in the thermometry of a substance inside a furnace, the temperature from a reflection source substance is caught by another thermometer, and used as an input.
4. 2 input selection
In addition to the detector output, this instrument receives a temperature signal having a different measuring range, and switches these signals by a set temperature in the overlapped scale range. Thus, a wide measuring range can be covered by a one-range output.
 Temperature input signal : 4 to 20mA DC linear (input scaling is as specified)
 This function is applicable to the program control to use thermocouples in a low temperature range and switch to radiation thermometers in a high temperature range.
5. Emissivity calibration
In addition to the detector output, this instrument receives another temperature signal to automatically set the emissivity, so that the converter output meets the temperature indications at optional timing.
 - Temperature input signal : 4 to 20mA DC linear (input scaling is as specified)
 - Setting command : by side panel key, external contact, or communication (option)

■ OPTION (IR-GAG only)

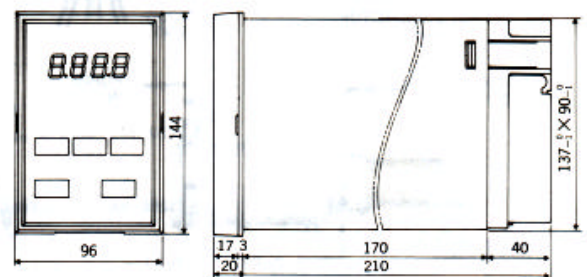
COMMUNICATIONS INTERFACE: RS-232C or RS-422A

■ EXTERNAL DIMENTIONS

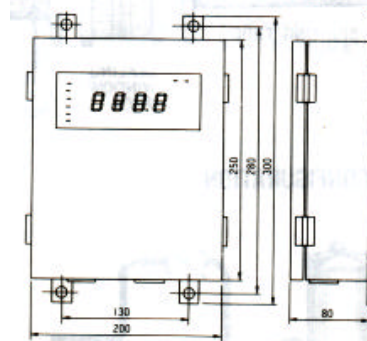
- _General_panel-back-mount_type



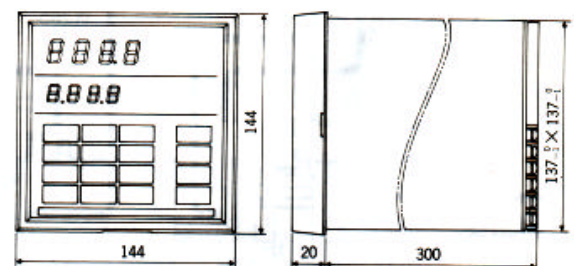
- General panelmount type



- General wafimount type



- Multifunction panelmount type



Unit: mm

ACCESSORIES

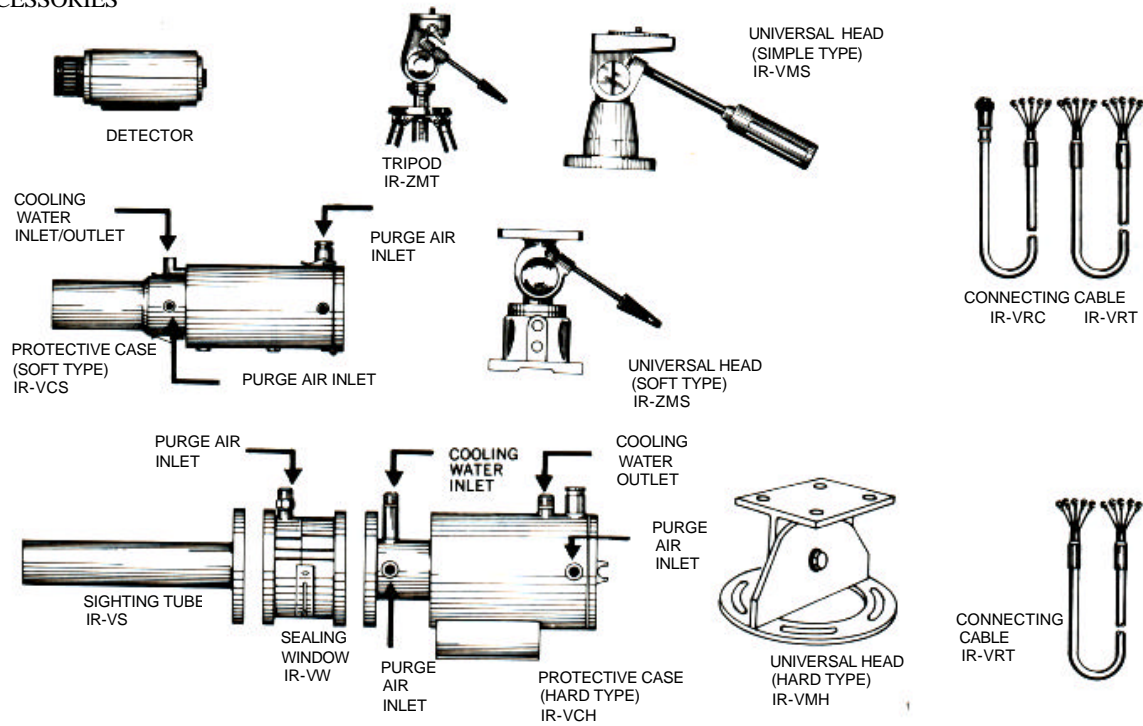
MODEL IR-V

■ CONFIGURATION

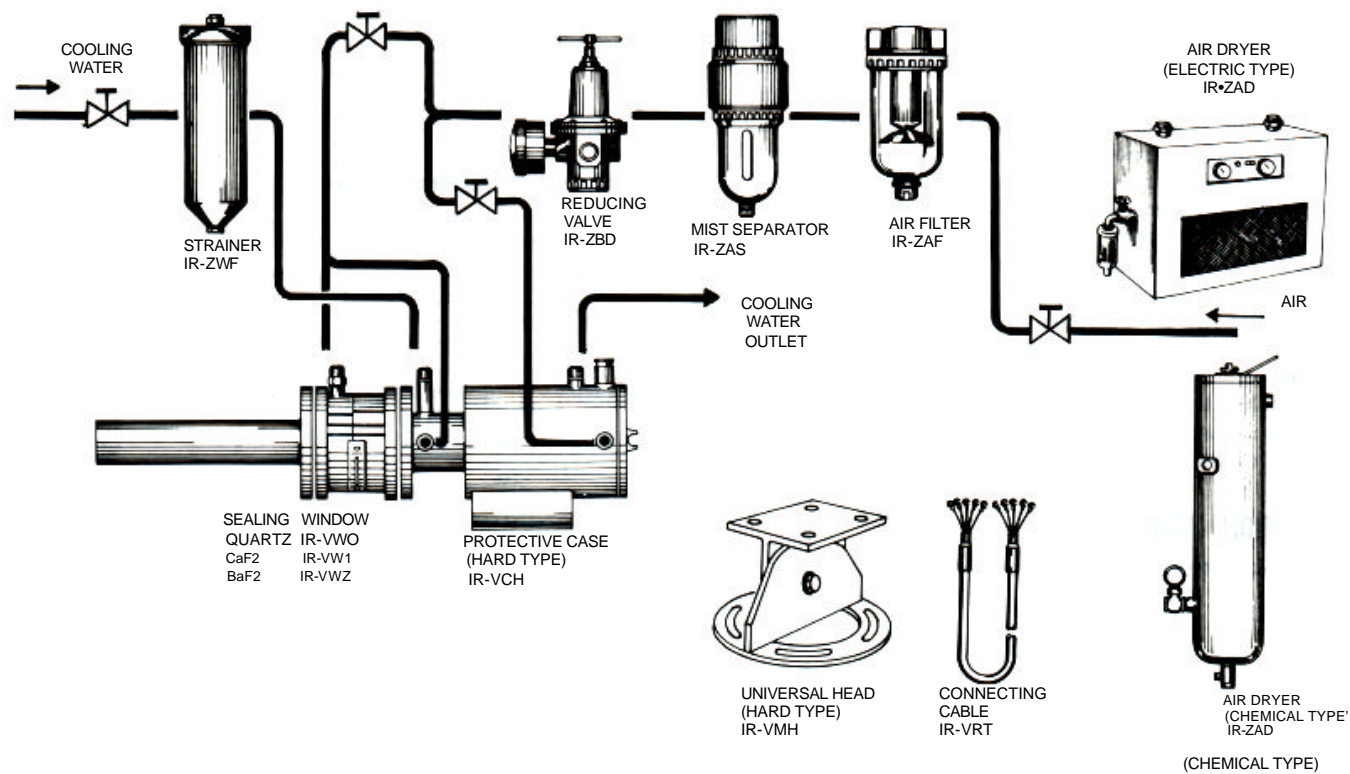
Various accessories for the Digital Pyro Series infrared radiation thermometers are available to cover a wide

fields. Especially on unfavorable ambient conditions such as where the ambient temperature is high, where the optical path is subjected to smoke or dust, etc., these accessories ensure highly reliable and highly accurate measurements.

ACCESSORIES



ACCESSORIES CONFIGURATION



• Mirror
MODEL IR-VLM

Used for bending the optical path rectangularly by mounting it on the object lens tip
Weight : about 300g

COVER GLASS MOUNTING PART

• Eyepiece filter
MODEL IR-VLF

Used for protecting eyes by the extinction filter, for the measurement of a high temperature object of higher than 1500°C
Can easily be fitted to the eyepiece tube

• Close-up lens MODEL IR-VD

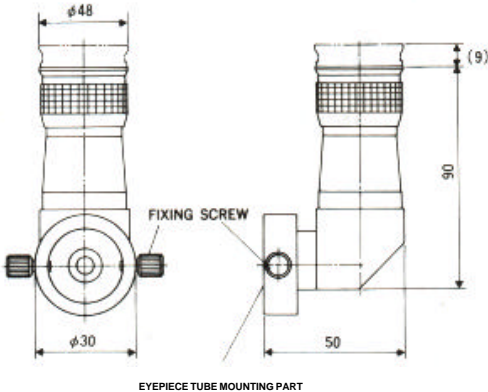
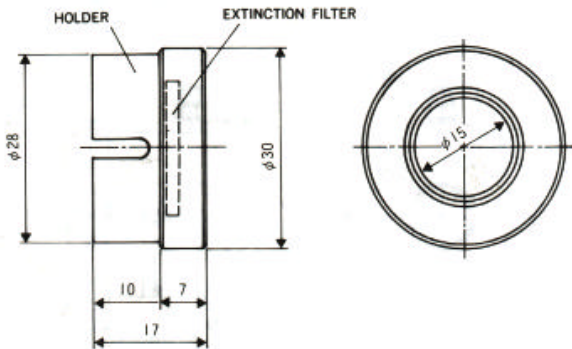
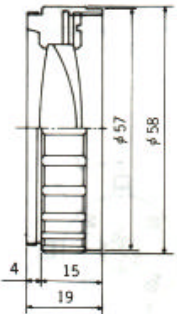
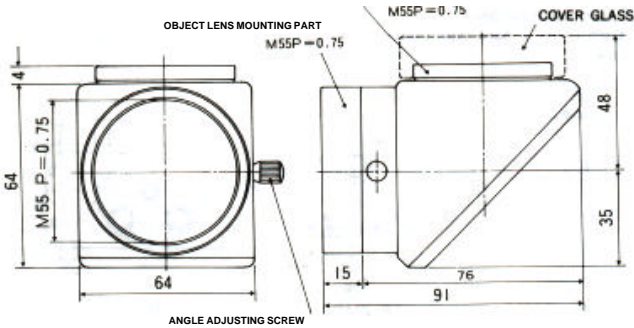
Used for measuring at a measuring distance of nearer than 0.5m (for IR.AP, IR.AQ only)

• Angle finder

MODEL IR-VLA

Used for confirming a visual field from transverse direction
Can easily be fitted to the eyepiece tube
Weight : about 130g

Model	Measuring distance
IR-vDI2	100 to 120mm
IR-vDI5	115 to 150mm
IR-VD2O	145 to 200mm
IR-VD3O	190 to 300mm
IR-VD6O	270 to 600mm



Specifications subject to change without notice. Original 2000.12

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