IR-FA SERIES
FIBER OPTIC RADIATION THERMOMETER

PS PERFORMANCE SPECIFICATION

CHINO

The IR-FA series is a fiber optic radiation thermometer featuring multi-function and high-speed response. Three types, single-color type for low temperature, single-color type for medium/high temperature and two-color type, are available. Parameter setting function, signal modulation and optional analog output are built in. Various options including lens assembly with finder, laser-spotting function, analog input and communications interface are available.

IR-FAS, -FAQH

IR-FACR

■ FEATURES

· Low temperature type with high-speed response (20ms) and short wavelength enables to measure objects with low emissivity like as metals.

· Medium/high temperature type with high accuracy (±0.5 to 1% for 1000 to 2000°C) and high-speed response (10ms) is for various temperature measurement fields.

· Two-color type is stable with less effectiveness of smoke, vapor, dust and lack-of-view.

· Digital temperature display and parameter setting with front key operation

· Temperature measurement of inductive heating object, measurement in explosion-proof environment, measurement in vacuum equipment and other measurement are possible.

· By using heat-resistive fiber optic, measurement in the environment at 150°C is possible without any water-cooling.
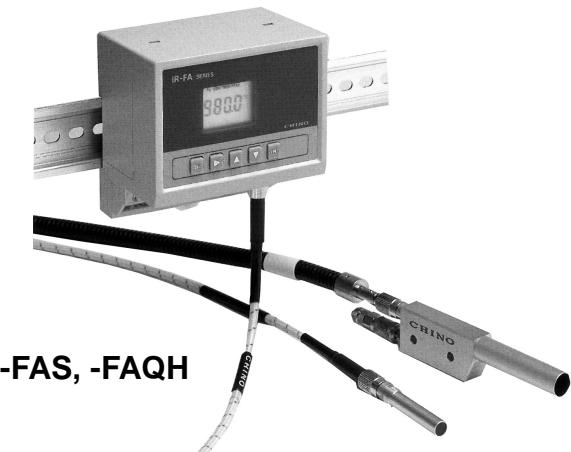
· By signal modulation function, the stable temperature measurement is possible.

· Laser function for easy spotting of measuring point (option)

· A lens assembly with finder for spotting of measuring point with eyes is available from accessories.

· By the communications interface (RS-485), the data logging and parameter setting are enabled from a personal computer.

· Emissivity setting (emissivity ratio for two-color type) by analog input or automatic emissivity computation function is selectable. (option)

· CE conformance

■ MODELS

● Thermometer

IR-FACR□□

Element
R: PbS (Cooling type)

External input/output (option)
N: None
S: Communications interface
RS-485
5: Analog input, 4 to 20mA DC

Laser function (option)
N: None
L: Provided

IR-FA□□□□

Element
I: InGaAs
S: Si

External input/output (option)
N: None
S: Communications interface
RS-485
5: Analog input, 4 to 20mA DC

Laser function (option)
N: None
L: Provided

High sensitivity type
N: None
U: High sensitivity type
(without laser)

High sensitivity type is ex-
cluded from CE conformance.

IR-FAQ□□□

Element
I : InGaAs/InGaAs
H: InGaAs/Si

External input/output (option)
N: None
S: Communications interface
RS-485
5: Analog input, 4 to 20mA DC

Laser function (option)
N: None
L: Provided

● Power supply unit

IR-ZFEP

● Lens assembly

IR-FL□□□□□

Distance and diameter
Refer to "Distance /diameter".

Air purge case
N: None
A: Provided

Fiber sheath
 J: Without metallic protective
tube
(for core 800μm) for only
IR-FACR
H: Without metallic protective
tube
(for core 400μm)
K: With metallic protective
tube
(for core 800μm) for only
IR-FACR
N: With metallic protective
tube
(for core 400μm)

Fiber length
Specify length in meters.

■ CONFIGURATION

2
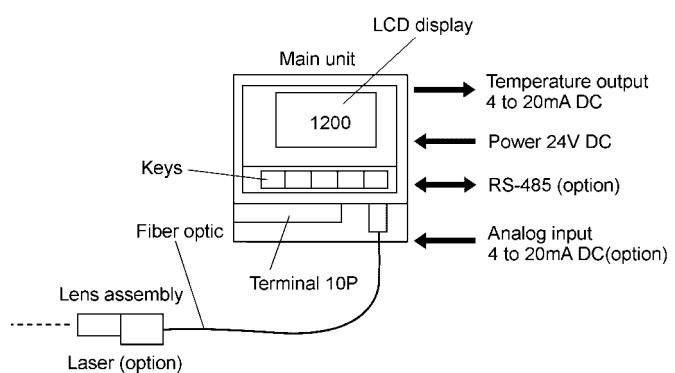
■ SPECIFICATIONS

● Thermometer

Model	IR-FACR	IR-FAI	IR-FAS	IR-FAQI	IR-FAQH
Measuring system	Single color type			Two- color type	
Element	PbS (cooling type)	InGaAs	Si	InGaAs/InGaAs	InGaAs/Si
Wavelength	2.0µm	1.55µm	0.9µm	1.35/ 1.55µm	0.9 / 1.55µm
Accuracy ratings (ε =1.0)	70°C to 300°C: ±4°C 300°C to 500°C: ±5°C Higher than 500°C: ±1.0 % of measured value	Lower than 1000°C: ±5°C 1000°C to 1500°C: ±0.5% of measured value 1500°C to 2000°C: ±1.0% of measured value Higher than 2000°C: ±2% of measured value			
Repeatability	2°C or less				
Temperature drift	0.2°C/°C	0.1°C/°C or 0.015% of measured value, whichever is larger		0.2°C/°C or 0.02% of measured value, whichever is larger	
Resolution	70°C to 100°C: About 3°C 100°C to 200°C: About 2°C Higher than 200°C: About 0.5°C	0.5°C		1.0°C	
Response time	0.02 second	0.01 second		0.04 second	
Emissivity (ratio) compensation	1.999 to 0.050 (*1)	Emissivity: 1.999 to 0.050		Emissivity ratio: 1.999 to 0.050	
Signal modulation	DELAY: Tracing of average value (smoothing) (Modulation ratio: 0.0 to 99.9 seconds, 0.1 second increment) Modulation ratio 0 = REAL PEAK: Tracing of maximum value (Modulation ratio: 0, 2, 5, 10°C/second), Modulation ratio 0 = PEAK HOLD				
Display	LCD 4-digit (Temperature display, parameter display), °C/°F (key selection)				
Analog output	4 to 20mADC isolated output (load resistance: 500Ω or lower) Accuracy rating: ±0.2% of output range Output resolution: 0.04% of output range (IR–FAC); 0.01% of output range (except IR–FAC) Output scaling: Setting within measuring temperature range Dummy output: Setting within 0 to 100% of analog output				
Contact output	2-point selectable from high/low, high/high, low/low alarm or error signal Photo-coupler 30V DC Max. 50mA	1-point, High (low) alarm or error signal, Photo-coupler 30V DC Maximum 50mA			
Contact input	1-point, peak hold reset or sample hold, Dry contact or open collector				
Parameter setting by keys	Operator mode: Settings of emissivity, signal modulation, alarms, etc. Engineering mode: Settings of engineering unit (°C/°F), output scaling, zero-span, reference temperature input for automatic emissivity calculation, output correction, etc., Settings of optional functions			Operator mode: Settings of emissivity ratio, signal modulation, alarms, etc. Engineering mode: Settings of engineering unit (°C/°F), output scaling, zero-span, reference temperature input for automatic emissivity ratio calculation, output correction, etc., Settings of optional functions	
Computing function	Zero-span adjustment, automatic emissivity (ratio) computation (*2), Output correction				
Self-diagnosis	Thermometer temperature abnormal, Parameter error				
Options — Laser function	Solid state built-in laser unit, 1mW (645nm) or less, Class 2 (not available in high sensitivity type)				
Options — Analog input	Input signal: 4 to 20mADC Remote setting of emissivity (ratio) or reference temperature input setting for automatic emissivity (ratio) computation				
Options — Communications IF	RS–485, Transmitting of measured data (down to 1 decimal point), Transmitting/receiving of parameters				
Working temperature	5 to 40°C	0 to 50°C			
Rated power supply	24V DC (Allowable voltage fluctuation range: 22 to 28VDC), Recommended power unit: IR–ZFEP				
Power consumption	Maximum 15VA	Maximum 3VA			
Connection	Cramp type no screw terminals				
Mounting	DIN rail mounting or wall mounting				
Case material	Steel	Resin			
Outside Dimensions, Weight	W 140 x H110 x D65mm About 1.0kg	W 90 x H90 x D60mm. About 250g			
CE	EN61326 +A1 Emission : Class A , Immunity: Annex A Table A.1				
Stability under EMC test environment	±10°C or ±1% of measuring range, whichever is larger(IR-FAQI: ±30°C or ±5% of measuring range, which is larger.)				
Condition of CE conformance	(1)The connection cable is up to 30m. (2)An individual DC power unit for thermometer is required. (Recommended power unit: IR–ZFEP) (3)All of the thermometer, the connection cable, and a DC power unit should be used indoors.				

*1: The effective compensation range is ε = 1.0 to 0.8 for the measured temperature of 70 to 80°C and ε = 1.0 to 0.6 for 80 to 90°C.
*2: The emissivity (ratio) is automatically computed by inputting the reference input temperature with key setting or analog input (option).

● Lens assembly and fiber optic

	Core 400μm	Core 800μm (IR-FAC)
Fiber	Single core quartz	
Sheath	Without metallic protective tube (Heat resistive sheath/glass wool braid) With metallic protective tube (Heat resistive sheath/glass wool braid + SUS flexible tube)	
Working temp.	0-150°C	0-50°C at measured value of 70-120°C 0-80°C at measured value of 120°C or higher
Length	4m (standard) for IR-FAC (max.5m) Specify 2-50m for IR-FAI, S or Q	2m
Allowable bending	R100mm	R150mm
Connection	Connector	
Mounting	Screw mounting	
Accessories	Aluminum air purge case, (1-5Nl/min)	

● Power supply unit   IR-ZFEP

Output Voltage: 24V DC

Power supply: 100 to 240V AC, 50/60Hz

Output current: 600mA

External dimensions: W45 x H75 x D96 mm

■ STANDARD RANGES

Type	Element	Measuring range	Lens assembly
IR-FACR	Cooling type PbS	70 - 250°C 100 - 300°C	IR-FL5, IR-FL6 IR-FL7 (Core 800μm)
		250 - 800°C	IR-FL0, IR-FL1 IR-FL2, IR-FL3 IR-FL4 (Core 400μm)
		150 - 500°C 250 - 800°C	IR-FL5, IR-FL6
		300 - 800°C	IR-FL8
IR-FAI, IR-FAS	InGaAs	150 - 450°C * 200 - 700°C 250 - 1000°C 300 - 1300°C	IR-FL5, IR-FL6
		250 - 1000°C 300 - 1300°C 350 - 1600°C	IR-FL0, IR-FL1 IR-FL2, IR-FL3 IR-FL4, IR-FL8
	Si	400 - 900°C * 500 - 1200°C 600 - 1800°C 700 - 2400°C	IR-FL5, IR-FL6
		600 - 1800°C 700 - 2400°C 800 - 3000°C	IR-FL0, IR-FL1 IR-FL2, IR-FL3 IR-FL4, IR-FL8
IR-FAQI	InGaAs/ InGaAs	250 - 900°C 300 - 1200°C 400 - 1500°C	IR-FL5, IR-FL6
		300 - 1200°C 400 - 1500°C	IR-FL0, IR-FL1 IR-FL2, IR-FL3 IR-FL4
		350 - 1200°C 400 - 1500°C	IR-FL8
IR-FAQH	InGaAs/ Si	500 - 1000°C 600 - 1500°C 700 - 2000°C 800 - 2400°C	IR-FL5, IR-FL6
		600 - 1500°C 700 - 2000°C 800 - 2400°C 1000 - 3000°C	IR-FL0, IR-FL1 IR-FL2, IR-FL3 IR-FL4, IR-FL8

* mark is high sensitivity type only. Without laser.
* mark is excluded from CE.

## ■ MEASURING DISTANCE AND MEASURING DIAMETER

For IR-FACR only (Core 800μm)

Type	Distance/diameter(mm)
IR-FL5□J IR-FL5□K	
IR-FL6□J IR-FL6□K	
IR-FL7□J IR-FL7□K	
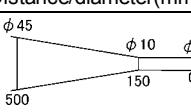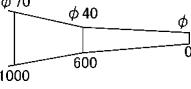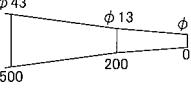
For IR-FACR, IR-FAI, IR-FAS, IR-FAQI, IR-FAQH (Core 400μm)

| Type	Distance/diameter(mm)	Type	Distance/diameter
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	
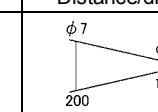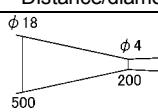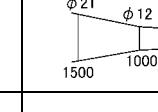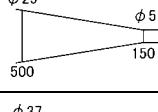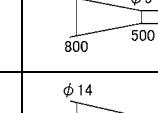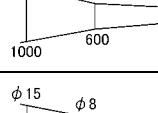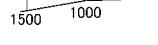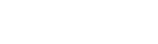
# ■ OUTSIDE DIMENSIONS

• Thermometer(IR-FAI,FAS,FAQ)   • IR-FACR
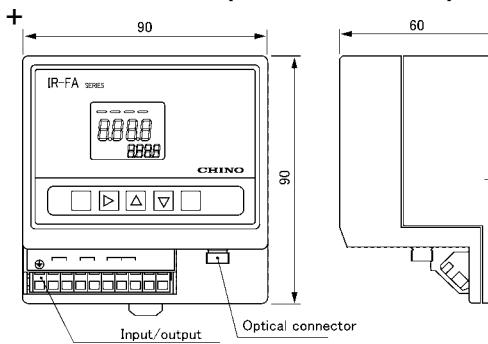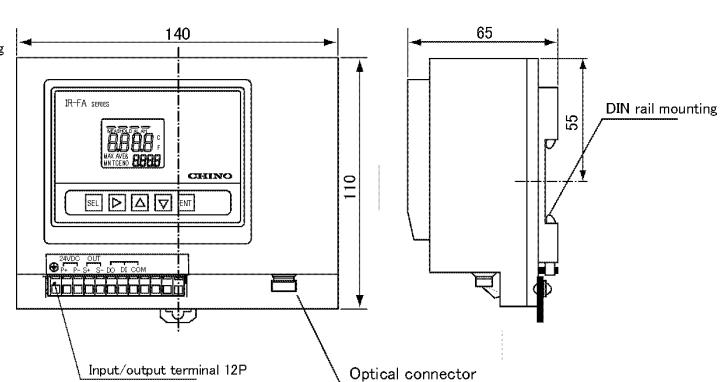
• Fiber without metallic protection tube (IR-ZFH□□, IR-ZFJ02)
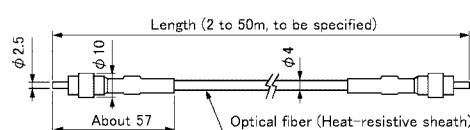

	Core 400μm	Core 800μm
IR-FACR	4m (max.5m)	2m
IR-FAI,FAS,FAQ	2m to 50m To be specified	

• Fiber with metallic protection tube (IR-ZFN□□, IR-ZFK02)
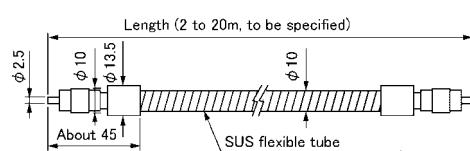
|	Core 400μm	Core 800μm
IR-FACR	4m (max.5m)	2m
IR-FAI,FAS,FAQ	2m to 20m To be specified	

• Lens assembly (IR-ZFL□)
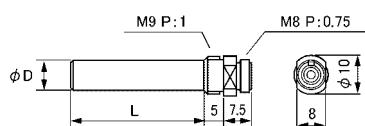
Lens assembly		0, 1, 2, 3	4	5	6	7	8
IR-FACR	L	35	15	10	10.5	8.5	45
	D	7.5				7.8	7.5
IR-FAI,FAS,FAQ	L	35	15	10	10.5		45
	D	7.5					7.5

• Air purge case (IR-ZFX02)
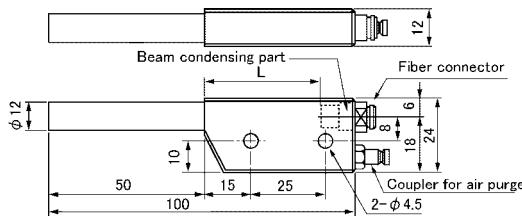
Lens assembly		0, 1, 2, 3	4	5	6	7	8
IR-FACR	L	10	30	35	34.5	36.5	0
IR-FAI,FAS,FAQ	L	10	30	35	34.5		0

Unit: mm

■ ACCESSORIES

- Air purge hard case IR-ZFX05

- Hard case with radiation seal IR-ZFX06
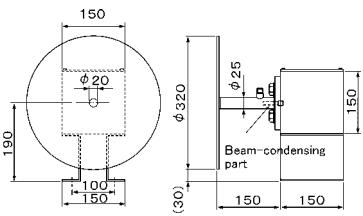
- Hard Case with water-cooling radiation seal IR-ZFX07

- Water-cooling case IR-ZFX08
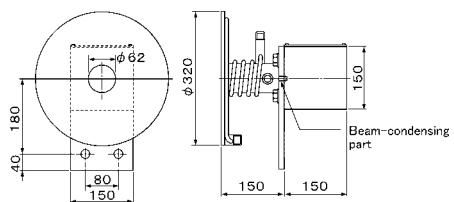
- Opto-couple type protection tube IR-FTC2
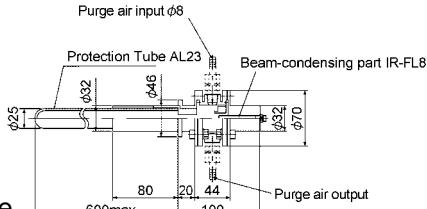
- Opto-couple type protection tube IR-FTCH1 (for vacuum furnace)

- Protection case for electro-magnetic tube IR-ZFX09
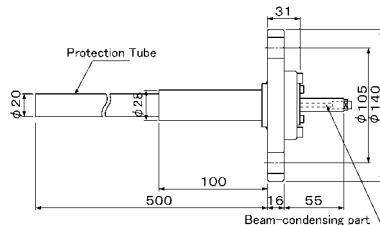
- Protection tube for continuous casting IR-ZFX10

- Measuring window for vacuum furnace IR-ZFX11
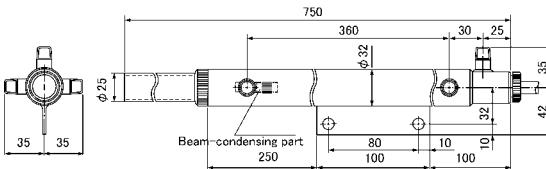
- Vacuum flange IR-ZFX12
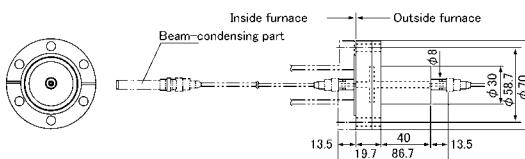
- Optical fiber connector IR-ZFX13

- Lens assembly with finder IR-FF□
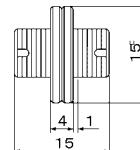
- Mirror adapter IR-ZFX04
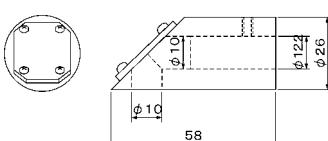
Measuring distance and measuring diameter

Type 1 (ø5 at 500)		Type 2 (ø4 at 370)		Type 3 (ø10 at 1000)	
Distance	Diameter	Distance	Diameter	Distance	Diameter
L_1 : 400	D_1 : ø7	L_1 : 270	D_1 : ø7	L_1 : 800	D_1 : ø11
L_2 : 500	D_2 : ø5	L_2 : 370	D_2 : ø4	L_2 : 1000	D_2 : ø10
L_3 : 600	D_3 : ø9	L_3 : 470	D_3 : ø9	L_3 : 1200	D_3 : ø15