

IR-FA SERIES FIBER OPTIC RADIATION THERMOMETER



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 analog output are built in. Various options including lens assembly with finder, laser spotting function, analog input and communications interface are available.

■ FEATURES

- Low temperature type with high-speed response (10ms) 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 settings of parameters by key operation
- Small and lightweight (90 x 90 x 60mm, about 250g), DIN-rail mounting
- 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 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 parameters 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)
- Conforming to CE (except Model IR-FACR)



IR-FAS, -FAQH



IR-FACR

■ MODELS

• Thermometer

IR-FACR□□

Element

R: PbS (Cooling type)

External input/output (option)

N: Not provided

S: Communications interface
RS-485

5: Analog input, 4 to 20mADC

Laser function (option)

N: Not provided

L: Built-in

IR-FA□□□□

Element

I: InGaAs

S: Si

External input/output (option)

N: Not provided

S: Communications interface
RS-485

5: Analog input, 4 to 20mADC

Laser function (option)

N: Not provided

L: Built-in

High sensitivity type

N: Not provided

U: High sensitivity type
(without laser)

High sensitivity type is
excluded from CE.

IR-FAQH□□

Element

QH: Hybrid Element

External input/output (option)

N: Not provided

S: Communications interface
RS-485

5: Analog input, 4 to 20mADC

Laser function (option)

N: Not provided

L: Built-in

• Power supply unit

IR-ZFEP

• Lens assembly

IR-FL□□□□

Distance and diameter

Refer to "Distance /diameter".

Air purge case

N: Not provided

A: Provided

Fiber sheath

J: Without metallic protective
tube
(for core 800μm) for only
IR-FACR

H: Without metallic protective
tube
(for core 400μm)

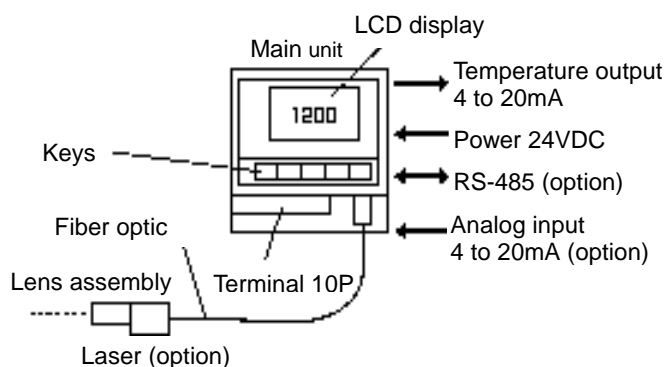
K: With metallic protective
tube
(for core 800μm) for only
IR-FACR

N: With metallic protective
tube
(for core 400μm)

Fiber length

Specify length in meters.

■ CONFIGURATION



■ SPECIFICATIONS

• Thermometer

Model	IR-FAC	IR-FAI	IR-FAS	IR-FAQH
Measuring system	Single color type			Two- color type
Element	PbS (cooling type)	InGaAs	Si	Hybrid Element
Wavelength	2.0μm	1.55μm	0.9μm	0.9 / 1.55μm
Accuracy ratings (ε =1.0)	70°C - 300°C: ±4°C 300°C - 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	0.2°C or less	0.2°C		
Temperature drift	0.2°C/°C	0.1°C/°C or 0.015% of measured value, whichever larger		0.2°C/°C or 0.02% of measured value whichever larger
Resolution	70°C - 100°C: About 3°C 100°C - 200°C: About 3°C Higher than 200°C: About 0.5°C	0.5°C		1.0°C
Response time	0.01 second			0.04 second
Emissivity (ratio) compensation	1.999 - 0.050 * ¹	Emissivity: 1.999 - 0.050		Emissivity ratio: 1.999 - 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 Isolate output (load resistance less than 500Ω) Accuracy rating: ±0.2% of output range Output resolution: 0.01% 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 30VDC, Maximum 50mA	1-point, High (low) alarm or error signal, Photo-coupler 30VDC, 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)		
	Analog input	Input signal: 4 - 20mADC Remote setting of emissivity (ratio) or reference temperature input setting for automatic emissivity (ratio) computation		
	Communications interface	RS-485 Transmitting of measured data (down to 1 decimal point), Transmitting/receiving of parameters		
Working temperature	5 - 40°C	0 - 50°C		
Rated power supply	24VDC (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	W140 x H110 x D65mm. About 1.0kg (main unit)	W90 x H90 x D60mm. About 250g (main unit)		
CE-marking	EN55011 Group 1 Class A, EN50082-2, excluding high sensitivity type			

*1: The effective compensation range is $\epsilon \approx 1.0$ to 0.8 for the measured temperature of 70 to 80°C and $\epsilon \approx 1.0$ 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 QH	2m
Allowable bending	R100mm	R150mm
Connection	Connector	
Mounting	Screw mounting	
Accessories	Aluminum air purge case, (1-5NI/min)	

• Power supply unit IR-ZFEP

Output Voltage: 24VDC
 Power supply: 100 to 240VAC, 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-FAQH	Hybrid Element	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.

• Relation of measuring distance and measuring diameter

For IR-FACR only (Core 800μm)

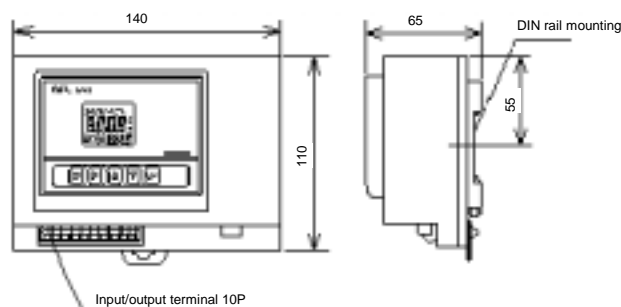
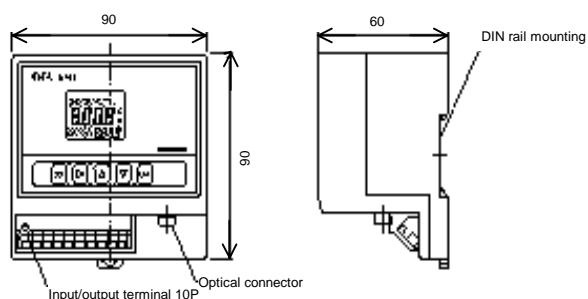
Type	Distance/diameter
IR-FL5□ J IR-FL5□ K	
IR-FL6□ J IR-FL6□ K	
IR-FL7□ J IR-FL7□ K	

For IR-FACR, IR-FAI, IR-FAS, IR-FAQH (Core 400μm)

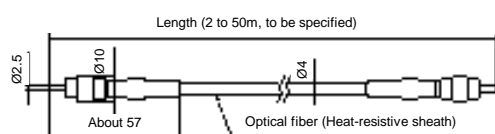
Type	Distance/diameter	Type	Distance/diameter
IR-FL0□ H IR-FL0□ N		IR-FL4□ H IR-FL4□ N	
IR-FL1□ H IR-FL1□ N		IR-FL5□ H IR-FL5□ N	
IR-FL2□ H IR-FL2□ N		IR-FL6□ H IR-FL6□ N	
IR-FL3□ H IR-FL3□ N		IR-FL8□ H IR-FL8□ N	

■ OUTSIDE DIMENSIONS

• Thermometer

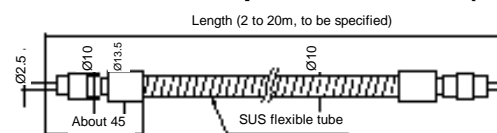


• Fiber without metallic protection tube (IR-ZFH□□ , IR-ZFJ02)



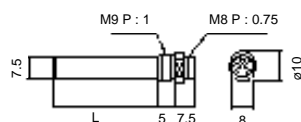
	Core 400μm	Core 800μm
Low temp.	4m (max.5m)	2m
Mid/low temp. Two-color	2m to 50m To be specified	

• Fiber with metallic protection tube (IR-ZFN□□ , IR-ZFK02)



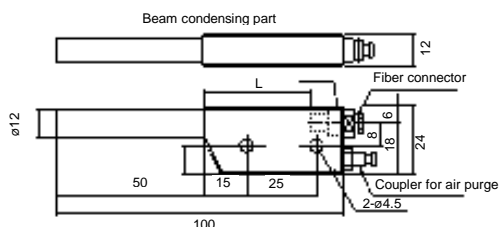
	Core 400μm	Core 800μm
Low temp.	4m (max.5m)	2m
Mid/low temp. Two-color	2m to 50m To be specified	

• Beam-condensing part (IR-ZFL□□)



Lens assembly		0, 1, 2, 3	4	5	6	7	8
Low temp.	L	35	15	10	10.5	8.5	45
	D	7.5				7.8	7.5
Mid./high temp. Two-color	L	35	15	10	10.5		45
	D	7.5					7.5

• Air purge case (IR-ZFX02)

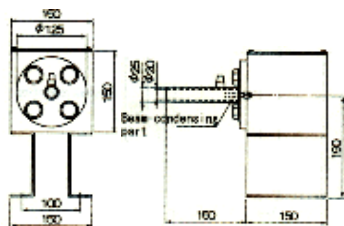


Lens assembly		0, 1, 2, 3	4	5	6	7	8
Low temp.	L	10	30	35	34.5	36.5	0
	L	10	30	35	34.5		0

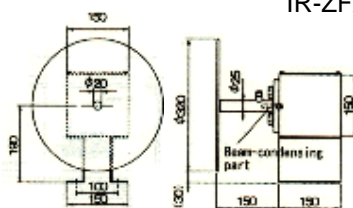
Unit: mm

■ ACCESSORIES

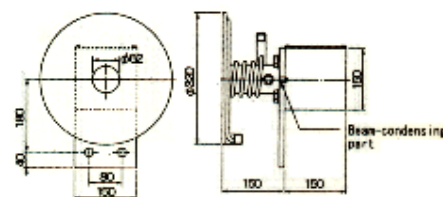
● Air Purge Hard Case IR-ZFX05



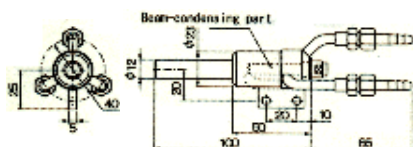
● Hard Case with Radiation Seat IR-ZFX06



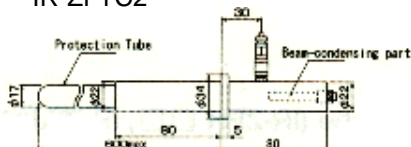
● Hard Case with Water-cooling Radiation seal IR-ZFX07



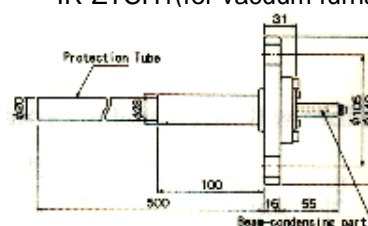
● Water-cooling Case IR-ZFX08



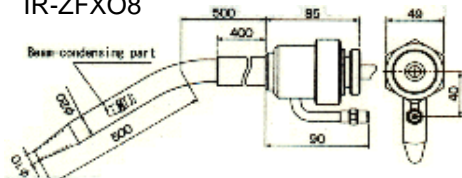
● Opto-couple Type Protection Tube IR-ZFTC2



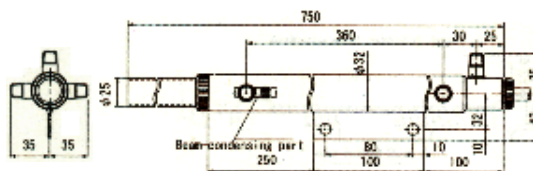
● Opto-couple Type Protection Tube IR-ZTCH1(for vacuum furnace)



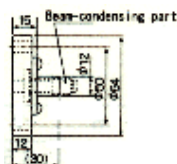
● Protection Case for Electro-magnetic Tube IR-ZFX08



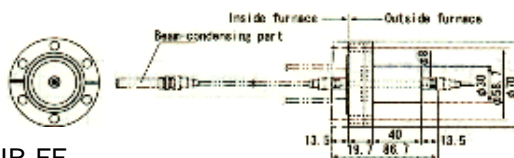
● Protection Tube for Continuous Casting IR-ZFX08



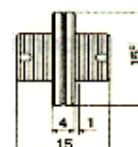
● Measuring Window for Vacuum Furnace IR-ZFX11



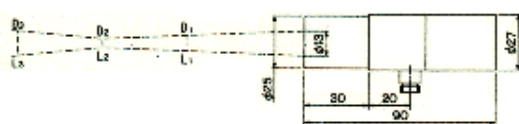
● Vacuum Range IR-ZFX12



● Optical Fiber Connector IR-ZFX13



● Beam-condensing Part with Finder IR-FF



● Mirror Adapter IR-ZFX04



Measuring Distance & Measuring Diameter

Type (φ5 at 500)		Type 2(φ4 at 370)		Type 3(φ10 at 1000)	
Distance	Dia.	Distance	Dia.	Distance	Dia.
L1 : 400	D1 : φ7	L1 : 270	D1 : φ7	L1 : 800	D1 : φ11
L2 : 500	D2 : φ5	L2 : 370	D2 : φ4	L2:1000	D2 : φ10
L3 : 600	D3 : φ9	L3 : 470	D3 : φ9	L3:1200	D3 : φ15

Specifications subject to change without notice. Original 2001.7

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