IR-FA SERIES
FIBER OPTIC RADIATION THERMOMETER

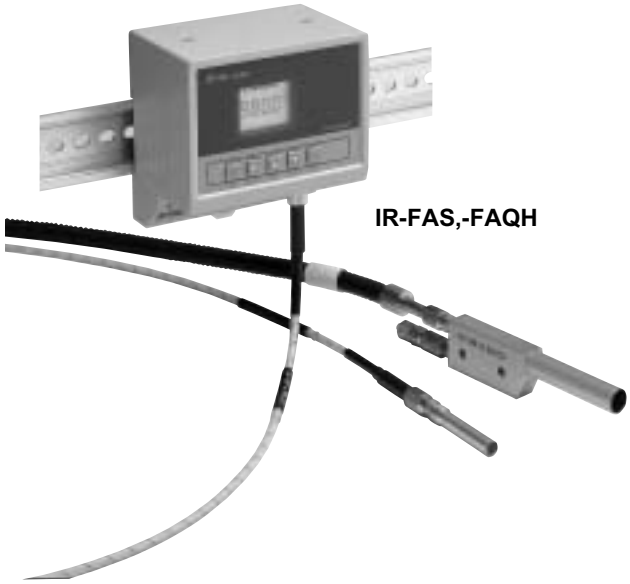
PERFORMANCE SPECIFICATION
CHINO

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.

IR-FA series realized usability and stable temperature measuring as digital temperature display and parameter setting functions, signal modulation and optional analog output are built in.

Various options including lens assembly with finder, laser-spotting function, communications interface and analog input which enables emissivity external settings or automatic emissivity computation are available.



IR-FAS,-FAQH

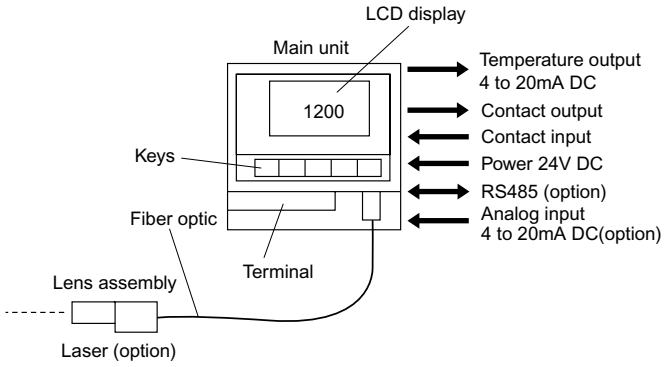
IR-FACR

■ 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℃) 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.**
- **Temperature measuring of high speed movement material, inductive heating object, explosion-proof environment and vacuum equipment are applicable.**

- **Digital temperature display and parameter setting with key operation.**
- **Compact, light weight and DIN rail mounting.**
- **By using heat-resistive fiber optic, measuring in the environment at 150℃ is possible without any water-cooling.**
- **Stable temperature measuring is possible by signal modulation function.**
- **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.**
- **Communications interface (RS485) enables data logging and parameter setting on a computer.**
- **Emissivity setting (emissivity ratio for two-color type) by analog input or automatic emissivity computation function is selectable. (option)**
- **CE conformed.**

■ STRUCTURE



■ MODELS

Main unit models

Low temperature (single-color type)	Medium/high temperature (single-color type)	Two-color type

IR-FACR □□

- **Element**
  - R : PbS (Cooling type)
- **External input/output (option)**
  - N : None
  - S : Communications interface RS485
  - 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 RS485
  - 5 : Analog input 4 to 20 mA DC
- **Laser function (option)**
  - N : None
  - L : Provided
- **High sensitivity type**
  - N : None
  - U : High sensitivity type (without laser)

IR-FAQ□□□

- Element
  - I : InGaAs
  - S : Si
  - H : Hybrid element
- **External input/output (option)**
  - N : None
  - S : Communications interface RS485
  - 5 : Analog input 4 to 20 mA DC
- **Laser function (option)**
  - N : None
  - L : Provided

Lens assembly models

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)
  - H : Without metallic protective tube (for core 400μm)
  - K : With metallic protective tube (for core 800μm)
  - N : With metallic protective tube (for core 400μm)
- **Fiber length** Refer to page 5, specify in meters
  - 2m only for core 800μm
  - Standard 4m (Max 5m) for core 400μm

IR-FL□□□□□

- **Distance and diameter (refer to "Distance/diameter")**
  - 0 : ϕ1mm for 100mm
  - 1 : ϕ12mm for 1000mm
  - 2 : ϕ5mm for 500mm
  - 3 : ϕ2mm for 200mm
  - 4 : ϕ4mm for 200mm
  - 5 : ϕ5mm for 150mm
  - 6 : ϕ20mm for 600mm
  - 8 : ϕ8mm for 1000mm
- **Air purge case**
  - N: None
  - A: Provided
- **Fiber sheath**
  - H: Without metallic protective tube (for core 400μm)
  - N: With metallic protective tube (for core 400μm)
- **Fiber length** Refer to page 5, specify in meters

Standard scale and objective lens assembly

Measuring range	Lens assembly models	Fiber sheath
70 to 250℃	IR-FL5□J,K	J,K
100 to 300℃	IR-FL6□J,K	(Core 800μm)
	IR-FL7□J,K	
250 to 800℃	IR-FL0□H,N	H,N (Core 400μm)
	IR-FL1□H,N	
	IR-FL2□H,N	
	IR-FL3□H,N	
	IR-FL4□H,N	
150 to 500℃	IR-FL5□H,N	
250 to 800℃	IR-FL6□H,N	
300 to 800℃	IR-FL8□H,N	

InGaAs element

Measuring range	Lens assembly
150 to 450℃*1*2	IR-FL5
200 to 700℃*2	IR-FL6
250 to 1000℃*2	
300 to 1300℃	
250 to 1000℃*2	IR-FL0
300 to 1300℃	IR-FL1
350 to 1600℃	IR-FL2
	IR-FL3
	IR-FL4
	IR-FL8

Si element

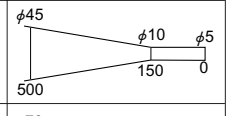
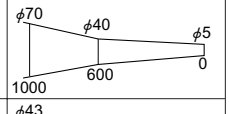
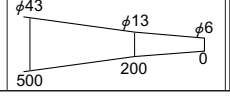
Measuring range	Lens assembly
400 to 900℃*1	IR-FL5
500 to 1200℃	IR-FL6
600 to 1800℃	
700 to 2400℃	
600 to 1800℃	IR-FL0
700 to 2400℃	IR-FL1
800 to 3000℃	IR-FL2
	IR-FL3
	IR-FL4
	IR-FL8

*1 High sensitivity type only (Laser-spotting function can not be added)
*2 Temperature may be indicated in error by reflecting of lighting (fluorescent or mercury lamp). Please ask for the details.

Measuring range	Lens assembly
InGaAs element	
300 to 1200℃ 400 to 1500℃	IR-FL5, IR-FL6
400 to 1500℃	IR-FL0, IR-FL1, IR-FL2, IR-FL3, IR-FL4
450 to 1500℃	IR-FL8
Si element	
800 to 1600℃ 1000 to 2000℃	IR-FL0, IR-FL1, IR-FL2, IR-FL3, IR-FL4, IR-FL5, IR-FL6
850 to 1600℃ 1000 to 2000℃	IR-FL8
Hybrid element	
600 to 1500℃ 700 to 2000℃ 800 to 2400℃ 1000 to 3000℃	IR-FL0, IR-FL1, IR-FL2, IR-FL3, IR-FL4, IR-FL5, IR-FL6, IR-FL8

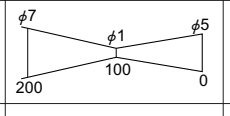
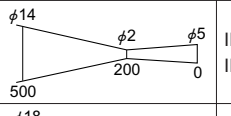
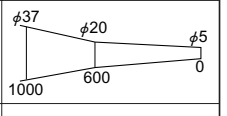
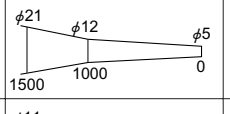
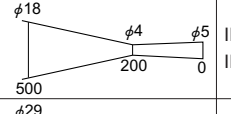
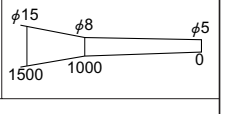
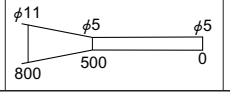
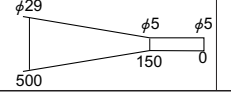
Distance and diameter

●Low temperature only (core 800μm)

Models	Distance and diameter (mm)
IR-FL5□J IR-FL5□K	
IR-FL6□J IR-FL6□K	
IR-FL7□J IR-FL7□K	

●Low temp., medium/high temp. and 2 color types common (core 400μm)

1/2 of diameter is possible by combining with core 200μm fiber. Please ask for the details.

Models	Distance and diameter (mm)	Models	Distance and diameter (mm)	Models	Distance and diameter (mm)
IR-FL0□H IR-FL0□N		IR-FL3□H IR-FL3□N		IR-FL6□H IR-FL6□N	
IR-FL1□H IR-FL1□N		IR-FL4□H IR-FL4□N		IR-FL8□H IR-FL8□N	
IR-FL2□H IR-FL2□N		IR-FL5□H IR-FL5□N			

■ SPECIFICATIONS

Models		Low temperature	Medium/high temperature		Two color type		
		IR-FACR	IR-FAI	IR-FAS	IR-FAQI	IR-FAQS	IR-FAQH
Measuring system		Single color type	Single color type		Two color type		
Element		PbS (cooling type)	InGaAs	Si	InGaAs/InGaAs	Si/Si	Si/InGaAs
Wavelength		2.0μm	1.55μm	0.9μm	1.35/1.55μm	0.85/1.00μm	0.9/1.55μm
Accuracy ratings (ε ≒ 1.0)		70℃ to 300℃ : ±4℃ 300℃ to 500℃: ±5℃ Higher than 500℃: ±1.0% of measured value	Lower than 1000℃:±5℃ 1000℃ to 1500℃:±0.5% of measured value 1500℃ to 2000℃: ±1.0% of measured value Higher than 2000℃: ±2% of measured value				
Repeatability		2℃ or less	0.2℃				
Temperature drift		0.2℃/ ℃	0.1℃/ ℃ or 0.015% of measured value, whichever is larger Under test environment required by EMS directive, ±10℃ or ±1% of measured value, whichever is larger		0.2℃/ ℃ or 0.02%/ ℃ of measured value, whichever is larger Under test environment required by IMC directive IR-FAQI, IR-FAQS --- ±30℃ or ±5% of measured value, whichever is larger IR-FAQH --- ±10℃ or ±1% of measured value, whichever is larger		
Resolution		70℃ to 100℃: Approx 3℃ 100℃ to 200℃: Approx 2℃, Higher than 200℃: Approx 0.5℃	0.5℃		1.0℃		
Response time		20ms	10ms		40ms		
Emissivity (ratio) compensation		Set value: 1.999 to 0.050*1	Set value: 1.999 to 0.050		Ratio set value: 1.999 to 0.050		
Signal modulation		DELAY: Tracing of average value (smoothing) (modulation ratio: 0.0 to 99.9s, 0.1s step optional), modulation ratio 0= REAL PEAK: Tracing of maximum value (modulation: 0, 2, 5, 10 ℃/s selectable), modulation ratio 0= peak hold					
Display		LCD 4 digit (Temperature display, parameter display).					
Analog output		4 to 20 mA DC 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, reference temperature input for automatic emissivity calculation, etc. Engineering mode: Settings of output scaling, zero-span, automatic emissivity calculation, output correction, optional function, etc.			Operator mode: Setting of emissivity ratio, signal modulation, alarm, reference temperature input of automatic emissivity ratio calculation Engineering mode: Setting of output scaling, zero-span, automatic emissivity ratio calculation, output correction, optional functions		
Computing function		Zero-span adjustment, automatic emissivity computation*2, output correction			Zero-span adjustment, automatic emissivity ratio calculation*2, output correction		
Self-diagnosis		Thermometer temperature abnormal, parameter error					
Option	Laser function*3	Semi-conductor laser unit built-in. 1mW (645nm) or less, Class 2 (not available in high sensitivity type)					
	Analog input	Input signal: 4 to 20 mA DC Remote setting of emissivity or reference temperature input setting for automatic emissivity computation.			Input signal: 4 to 20 mA DC Remote setting of emissivity ratio or reference temperature input setting of automatic emissivity ratio calculation		
	Communications IF	RS485, transmitting of measured data (down to 1 decimal point), transmitting/receiving of parameters					
Working temperature		5 to 40 ℃	0 to 50 ℃				
Rated power supply		24V DC (allowable voltage fluctuation range: 22 to 28VDC)					
Power consumption		Maximum 15VA	Maximum 3VA				
Connection		Cramp type no screw terminals					
Mounting		DIN rail mounting or wall mounting					
Case material		Steel	Plastic				
Dimensions, weight		W140 x H110 x D65mm, about 1.0kg	W90 x H90 x D60mm About 250g				
CE		EMC directive: EN55011 Group 1 Class A, EN50082-2 (*except high sensitivity type)					
Standard accessories		Slotted screwdriver, instruction manual					

*1) The compensation range is ε≒1.0 to 0.8 for the measured temperature of 70 to 80℃ and ε≒1.0 to 0.6 for 80 to 90 ℃
*2) The emissivity (ratio) is automatically computed by inputting the reference input temperature with key setting or analog input (option).
*3) For IR-FACR, when used in combination with lens assembly models IR-FL1, IR-FL2, IR-FL6, IR-FL8, combination of external laser spotting unit (IR-ZFX16) is recommended for laser spotting function.

■ Lens assembly / fiber optic

	Core 400 μm	Core 800 μm (only for low temperature)
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 to 150℃	0 to 50℃ at measured value of 70 to 120℃ 0 to 80℃ at measured value of 120℃ or higher
Length	Refer to fiber length	
Allowable bending	R100mm	R150mm
Connection	Connector	
Mounting	Screw mounting	
Accessories	Air purge case Material: Aluminum Air flow: 1 to 5NL/min (clean air)	

■ Power supply unit IR-ZFEP

Output voltage	24V DC
Power supply	100 to 240V AC Universal power supply 50/60Hz
Output current	600mA
External dimensions	W45 x H75 x D96mm

■ Data logging software IR-VXF1(option)

Measured data logging by combination with IR-FA series radiation thermometer.

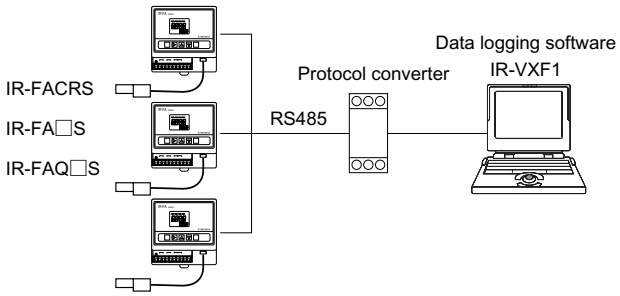
●Model

IR-VXF1□
└Language
J : Japanese
E : English

●General specification

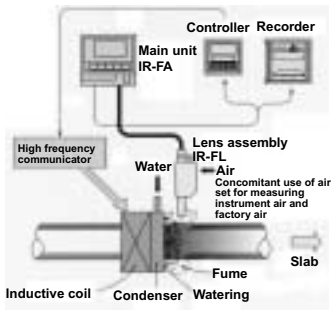
Operation environment	OS drive	Windows 2000/XP/Vista
	Hard drive	Capacity: 20MB or more
	Memory	256MB or more
	Drive	CD-ROM drive
	Interface	RS232C port 1pc
Function	Digital display and trend display of measured data	
	Data storing/replay(CSV type) and printing	
	Connecting unit: Maximum 3 units	

●Unit structure

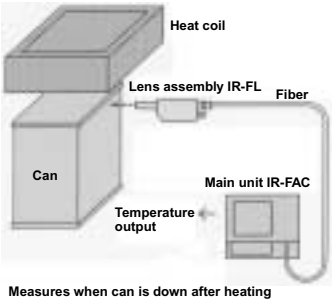


■ Example of use

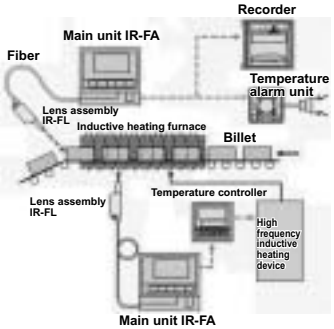
High frequency quenching temperature measuring



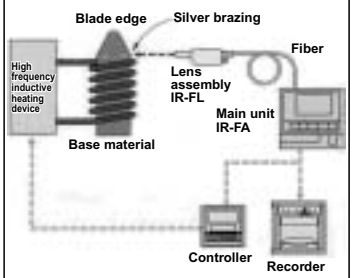
Can deposit heat temperature measuring



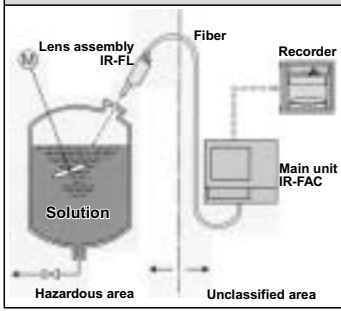
Billet temperature control, alarm, recording by high frequency heating



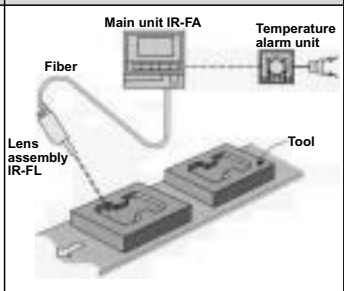
High frequency silver brazing temperature management



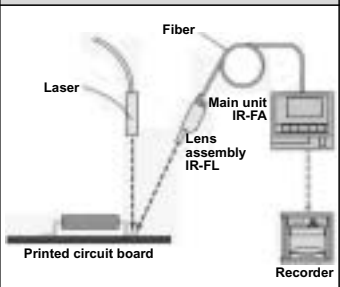
Measuring in explosion protection environment



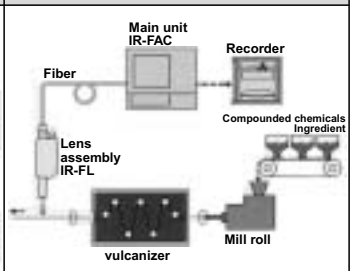
Tool temperature measuring



Lead frame soldered temperature measuring

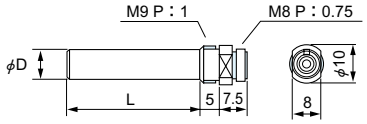


Rubber sheet temperature measuring



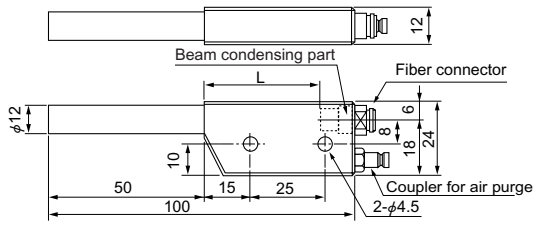
■ DIMENSIONS

●General lens assembly (single code: IR-ZFL□)



Lens assembly type		0,1,2,3	4	5	6	7	8
Low temperature	L	35	15	10	10.5	8.5	45
	ϕD	7.5				7.8	7.5
Medium/high temperature Two color type	L	35	15	10	10.5		45
	ϕD	7.5					7.5

●Air purge case (single code: IR-ZFX02)

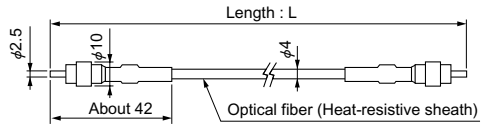


Lens assembly type		0,1,2,3	4	5	6	7	8
Low temperature	L	10	30	35	34.5	36.5	0
Medium/high temperature Two color type	L	10	30	35	34.5		0

(Unit: mm)

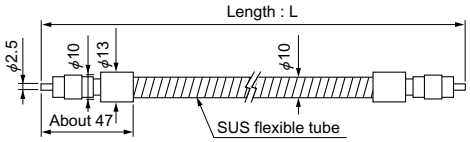
■ Fiber length

●Fiber without metallic protection tube
(Single code: IR-ZFH□□, IR-ZFJ02)



(Unit: mm)

●Fiber with metallic protection tube
(single code: IR-ZFN□□, IR-ZFK02)

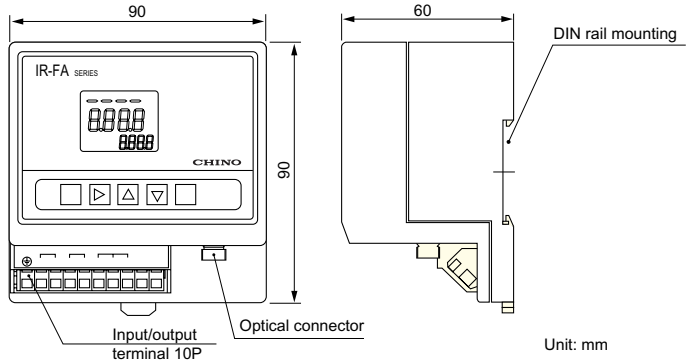


(Unit: mm)

Fiber length	Core 400μm	Core 800μm (only for low temperature)
Low temperature	2m, 4m, 5m	2m
Medium/high temperature, two color type	2m, 4m, 5m, 10m, 15m, 20m	–

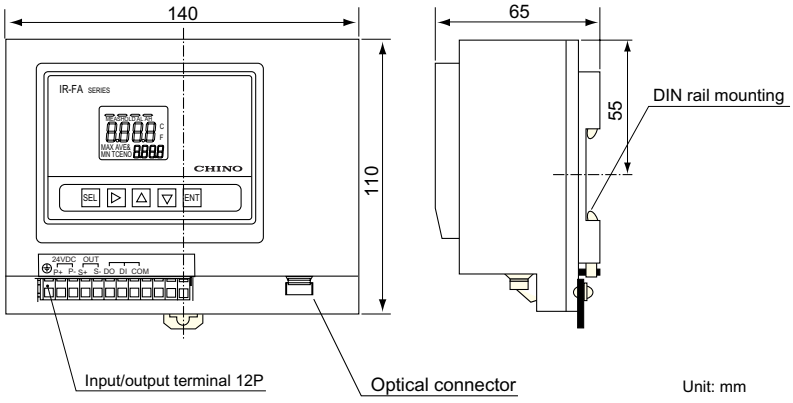
■ Main unit dimensions

●Medium/high temperature, two color type



Unit: mm

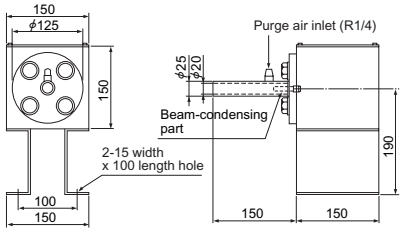
●Low temperature



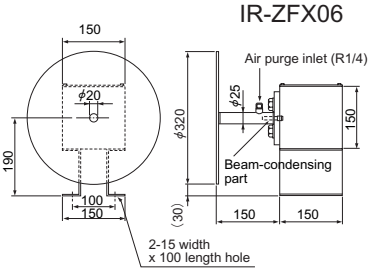
Unit: mm

■ACCESSORIES

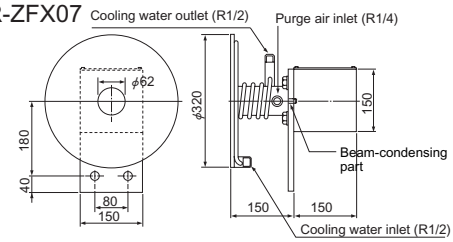
●Air purge hard case IR-ZFX05



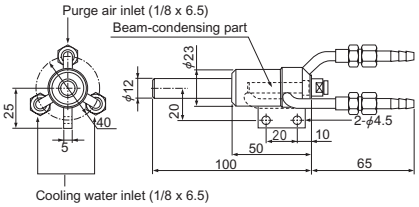
●Hard case with radiation seal IR-ZFX06



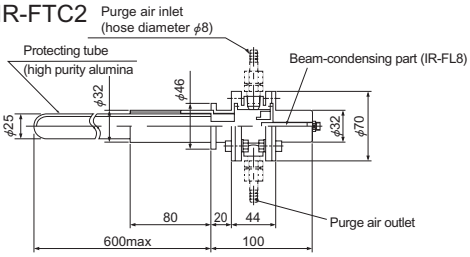
●Hard case with water-cooling radiation seal IR-ZFX07



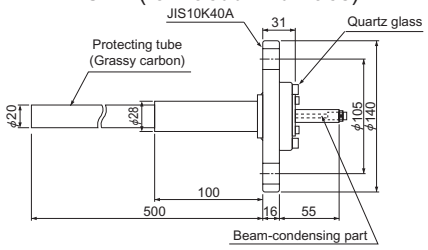
●Water-cooling case IR-ZFX08



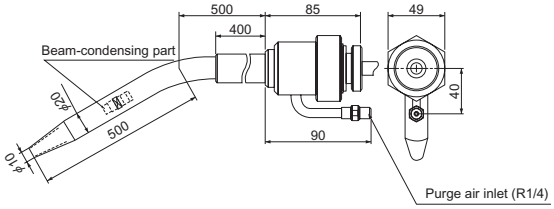
●Opto-couple type protecting tube IR-FTC2



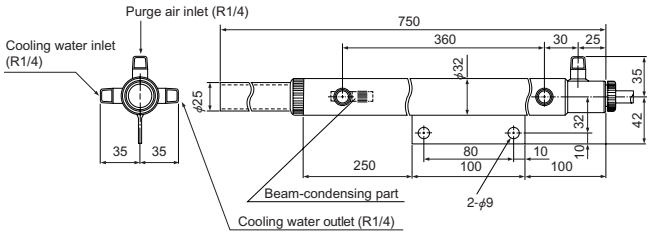
●Opto-couple type protecting tube IR-FTCH1 (for vacuum furnace)



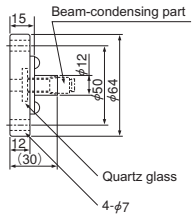
●Protecting case for electro-magnetic tube IR-ZFX09



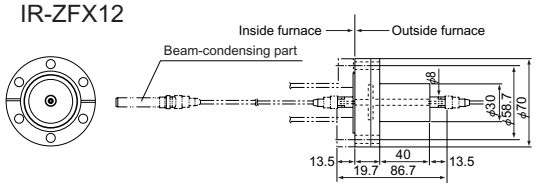
●Protecting tube for continuous casting IR-ZFX10



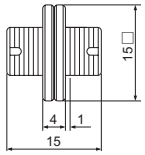
●Measuring window for vacuum furnace IR-ZFX11



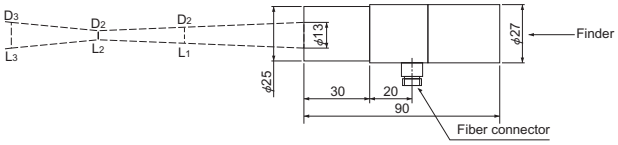
●Vacuum flange IR-ZFX12



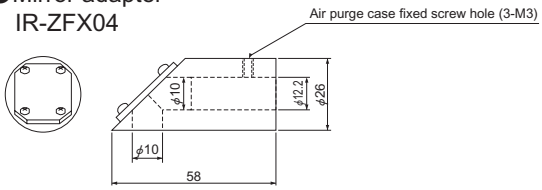
●Optical fiber connector IR-ZFX13



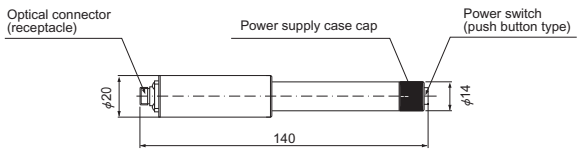
●Lens assembly with finder IR-FF□



●Mirror adapter IR-ZFX04



●Laser spotting unit IR-ZFX16 (Battery drive)



Measuring distance & measuring diameter

Type1 (ϕ5 at 500)		Type2 (ϕ4 at 370)		Type3 (ϕ10 at 1000)	
Distance	Diameter	Distance	Diameter	Distance	Diameter
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. Printed in Japan (I) 2009. 4

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