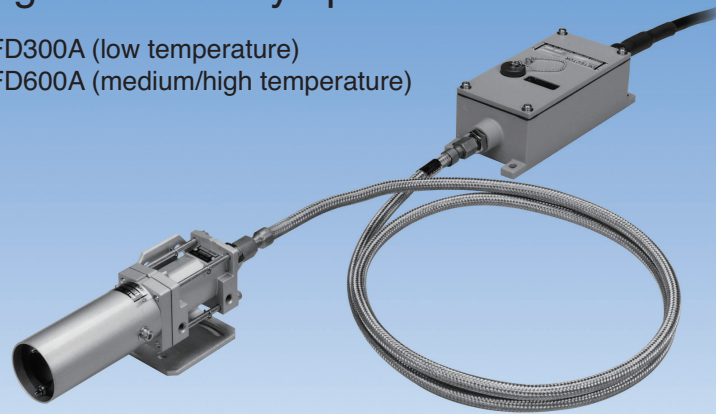


# FD<sup>300</sup>/<sub>600</sub>A series

Fiber type / HMD

5-point level indicator facilitating optical axis alignment  
Cooling unnecessary up to 200 °C

Model : FD300A (low temperature)  
Model : FD600A (medium/high temperature)



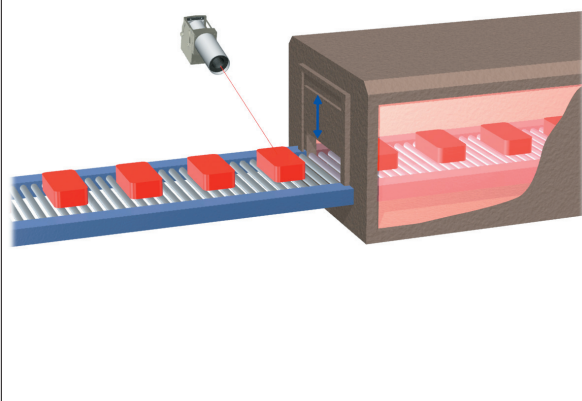
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The optical head and amplifier are connected with a fiber optic cable and the infrared ray captured with the optical head is transmitted through highly transmissive glass fiber into an amplifier installed at a distant location. The infrared ray transmitted into the amplifier is optically converted in the light sensitive element and amplified for control signal output (mini power relay, signal relay or solid state output).

Sensors for low temperature (FD300A Series) and medium/high temperature (FD600A Series) are available.

## Applications

Detecting presence or passage of red-hot material



## Features

- No cooling required  
The optical head integrating hood and optical lens and fiber optic cable have no electronic component, which allows use in ambient temperature of up to 200 °C without cooling.
- Excellent durability  
Reliable design with the hood and optical head made of metal, fiber optic cable covered with flexible stainless steel braid and metal cased amplifier provides robustness and resistance to heat and corrosion.
- 5 point level indicator  
Received light intensity is indicated at 5 levels, offering easy viewing of stability.
- Self check feature integrated (SAFETY feature)  
Operation can be checked with external signal. Stability check feature is provided, which outputs alarm signal (SAFETY ALARM) when there is not much margin in the received light intensity level at detection due to soiling of lens, light axis misalignment, etc. or external disturbing light or residual heat.
- Two types of detection field of view  
Standard view ( $\phi 50\text{mm/m}$ ) and Wide view ( $200 \times 40\text{mm/m}$ ,  $400 \times 30\text{mm/m}$ ) are available.

# FD300A·FD600A

## Ordering Guide

The FD-300A/FD600A Series does not have set model Nos. Order by specifying the individual model Nos. of components.

### Example

For ordering sensor with the following properties:

- Temperature of detection object: 600 °C or higher
- Mini power relay output
- Fiber length: 2 m
- Standard-view
- Compact, lightweight
- Airless hood

Component	Model	Quantity
Hood	F38A	1
Optical head	OHA	1
Fiber	FG2	1
Amplifier	FD600A	1

## [Optical head]

- The standard and wide types have different optical systems. Detection field of view characteristics (Typical example)

	Field of view	Model
Standard view		OHA
Wide view		OHW1
		OHW2

## [Hood]

Type	Length	Model	Applicable optical head	
Airless hood	Standard view	120mm	F38A	OHA OHAN OHAN10
		200mm	F38A-02	
		300mm	F38A-03	
		400mm	F38A-04	
		500mm	F38A-05	
Airless hood	Wide view	200mm	F38W	OHW1 OHW2
Air purge hood	Standard view	200mm	F38PC-02	OHA OHAN OHAN10
		300mm	F38PC-03	
		400mm	F38PC-04	
		500mm	F38PC-05	
	Air purge hood	Wide view	—	302W

## [Fiber optic cable]

Length	Model	Appearance (Typical example)
2m	FG2	
3m	FG3	
4m	FG4	
5m	FG5	
7m	FG7	
10m	FG10	
15m	FG15	
20m	FG20	
30m	FG30	

- Narrow view optical head  
See P.563 for details

## [Amplifier]

- Select an amplifier based on the temperature of the detection object. The lowest detectable temperature varies depending on the fiber length. Temperatures shown in the table below are applicable only when the heated material (object) is larger than the detection field of view. If the material is smaller than the detection field, the lowest detectable temperature is increased. For detailed data, see "Minimum Detectable Object and Lowest Detectable Temperature."

Type	Fiber length and detectable temperature					Applicable amplifier series	Output type	Model		
	Length	Model	Standard View	Narrow view	Wide view					
Low temperature	2m	FG2	360 °C or higher	490 °C or higher	425 °C or higher	FD300A series	Mini power relay output	FD300A		
	3m	FG3	375 °C or higher	510 °C or higher	440 °C or higher					
	4m	FG4	385 °C or higher	525 °C or higher	460 °C or higher		Signal relay output	FD300AH		
	5m	FG5	395 °C or higher	540 °C or higher	465 °C or higher					
	7m	FG7	415 °C or higher	560 °C or higher	485 °C or higher					
	10m	FG10	455 °C or higher	610 °C or higher	530 °C or higher					
	Medium/high temperature	15m	FG15	490 °C or higher	650 °C or higher		570 °C or higher	FD600A series	Mini power relay output	FD600A
		20m	FG20	510 °C or higher	680 °C or higher		595 °C or higher			
30m		FG30	540 °C or higher	720 °C or higher	625 °C or higher	Signal relay output	FD600AH			
2m		FG2	580 °C or higher	750 °C or higher	660 °C or higher					
3m		FG3	580 °C or higher	750 °C or higher	660 °C or higher					
4m		FG4	585 °C or higher	755 °C or higher	665 °C or higher					
5m		FG5	585 °C or higher	760 °C or higher	670 °C or higher	Solid state output	FD600AC			
7m		FG7	590 °C or higher	770 °C or higher	675 °C or higher					
10m	FG10	595 °C or higher	775 °C or higher	680 °C or higher						
15m	FG15	610 °C or higher	790 °C or higher	695 °C or higher						
20m	FG20	620 °C or higher	820 °C or higher	710 °C or higher						
30m	FG30	650 °C or higher	860 °C or higher	740 °C or higher						

The above is referential information on temperature of detected objects. (Fe: emissivity 0.8)

# FD300A · FD600A

For Steel & Heavy Industries

## Rating/Performance/Specification/Environmental Specification

Output specification				
Model	FD-300A FD-600A	FD300AH FD600AH	FD300AC FD600AC	
Output mode	Mini power relay output	Signal relay output	Solid-state output	
Control output	ON-OFF control (Light ON)			
Rating	1c 250VAC 5A or less (Resistive load)	1c 48VDC 0.5A or less (Resistive load)	250VAC/DC 0.5A or less (Resistive load)	
Response time	15ms or less	5ms or less	3ms or less	
SAFETY ALARM output				
	Rating	Relay output 1a Rating: 250VAC 5A or less (Resistive load)		
General specification				
Valid lens diameter	φ 28mm (OHA, OHAN, OHAN10)			
Power Supply	100 - 220VAC+10%, -15% 50/60Hz			
Power consumption	10W or less			
Connection	Cable with connector (CVV 1.25mm <sup>2</sup> , length 2m)			
Ambient temperature	Optical head, Fiber optic cable: -25°C to 200°C Amplifier: -25°C to 50°C (Non-freezing)			
Storage temperature range	-40°C to 70°C (Non-condensing)			
Ambient humidity	35 to 85%RH or less (Non-condensing)			
Fiber optic cable allowable bending radius	50mm			
Insulation resistance	Between power supply and case: 500VDC, 20 MΩ or higher			
	Between output and case: 500VDC, 20 MΩ or higher			
	Between power supply and output: 500VDC, 20 MΩ or higher			
Dielectric withstanding	Operation check input: Omitted			
	Between power supply and case: 1500VAC for 1 minute			
	Between output and case: 1500VAC for 1 minute			
	Between signal relay outputs: 1000VAC for 1 minute			
	Between power supply and output: 1500VAC for 1 minute			
Vibration	10-55 Hz / 1.5 mm double amplitude / 2 hours each in 3 direction			
	Shock 500 m/s <sup>2</sup> / 3 times each in 3 directions			
Protective structure IP66				
Weight	Optical head	Basic type (OHA): Approx. 680g Wide type (W1/W2): Approx. 1300g Narrow type (OHAN): Approx. 840g Narrow type (OHAN10): Approx. 860g		
	Airless hood	F38A : Approx. 240g F38A-03 : Approx. 430g F38A-05 : Approx. 650g	F38A-02 : Approx. 330g F38A-04 : Approx. 550g F38W : Approx. 600g	
	Air purge hood	F38PC-02 : Approx. 240g F38PC-04 : Approx. 370g 302W : Approx. 600g	F38PC-03 : Approx. 300g F38PC-05 : Approx. 440g	
	Fiber optic cable	FG2 : Approx. 0.7kg FG5 : Approx. 1.3kg FG15 : Approx. 3.1kg	FG3 : Approx. 0.9kg FG7 : Approx. 1.6kg FG20 : Approx. 4.1kg	FG4 : Approx. 1.1kg FG10 : Approx. 2.1kg FG30 : Approx. 6.1kg
	Amplifier	Approx. 1.5kg		

## Dimensions

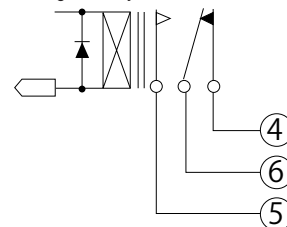
The dimensions are the same with the FD-A300P Series.  
See P. 552.

## Configuration

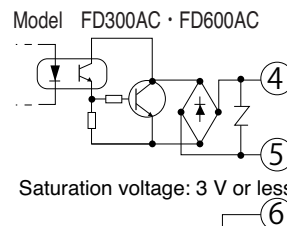
Configuration and functions of components are the same with model FD-A300P.  
See P. 553.

## Input/Output Circuit and Connection

- Control output  
Model FD300A · FD600A  
Model FD300AH · FD600AH



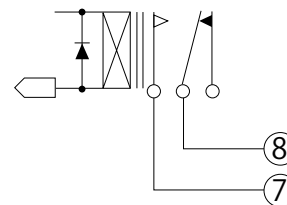
At light on: Output relay on



Saturation voltage: 3 V or less

At light on: Output transistor on

- SAFETY ALARM output (all models)

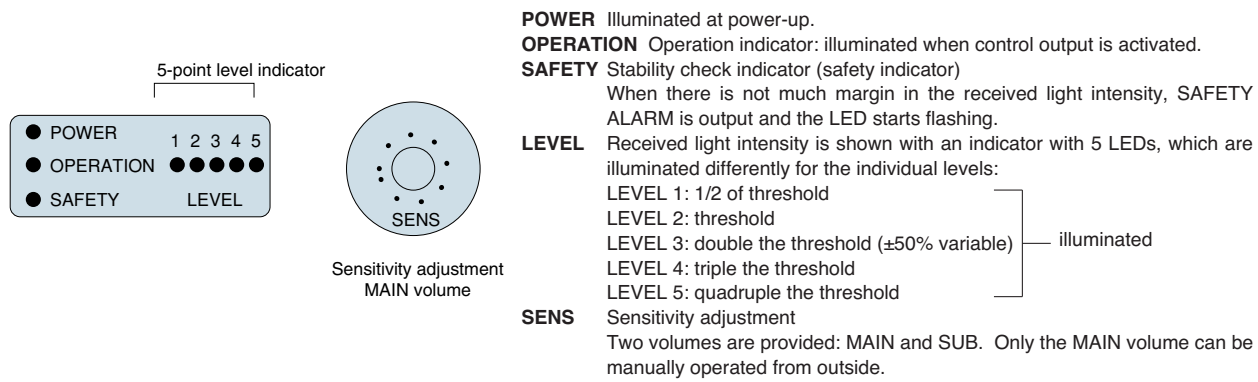


At failure: Relay on

When connecting an inductive load such as relay as the load, be sure to use diode, surge absorber, etc. for protection of output transistor from back electromotive force

# FD300A·FD600A

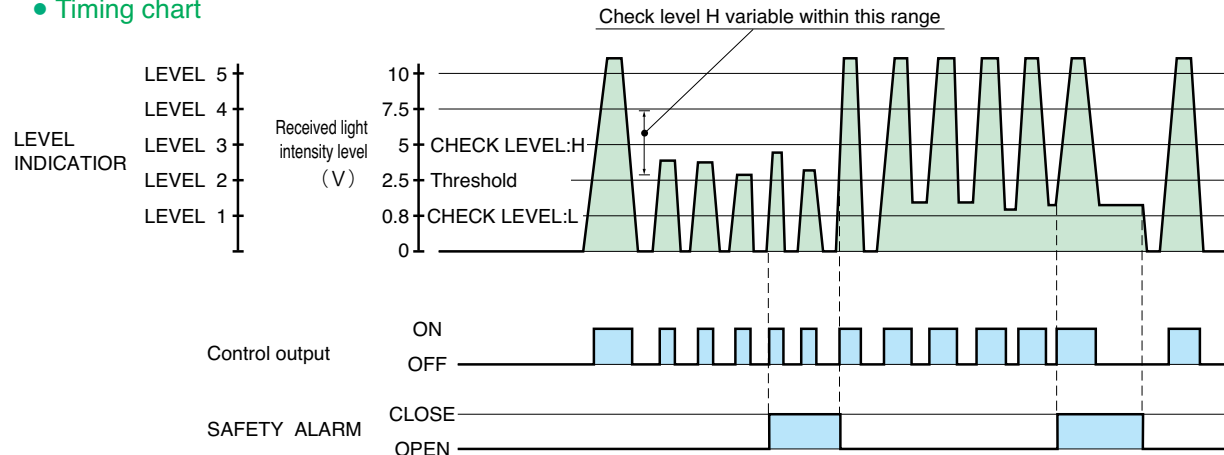
## Amplifier panel layout (with case lid removed)



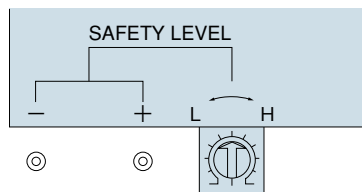
## Control Output and Stability Check Feature

- ◇ Control output: Issued when detecting infrared radiation from heated material.
- ◇ Stability check feature (SAFETY ALARM output): Self check feature. When there have been several consecutive detections with received light intensity at light reception less than double the threshold or intensity at light blocking state more than 1/2 of the threshold, a level error signal is output to notify of unstable detection.  
This check level of double the threshold is variable within 50% by adjusting the internal volume.  
This alarm output is automatically reset when the stable detection condition is restored.  
The timing chart below shows variation of received light intensity level at each passage of heated material and output condition.

### Timing chart



### Adjustment of SAFETY LEVEL for stability check



The volume is not provided on the surface.  
Remove the case lid to access the volume for adjustment.

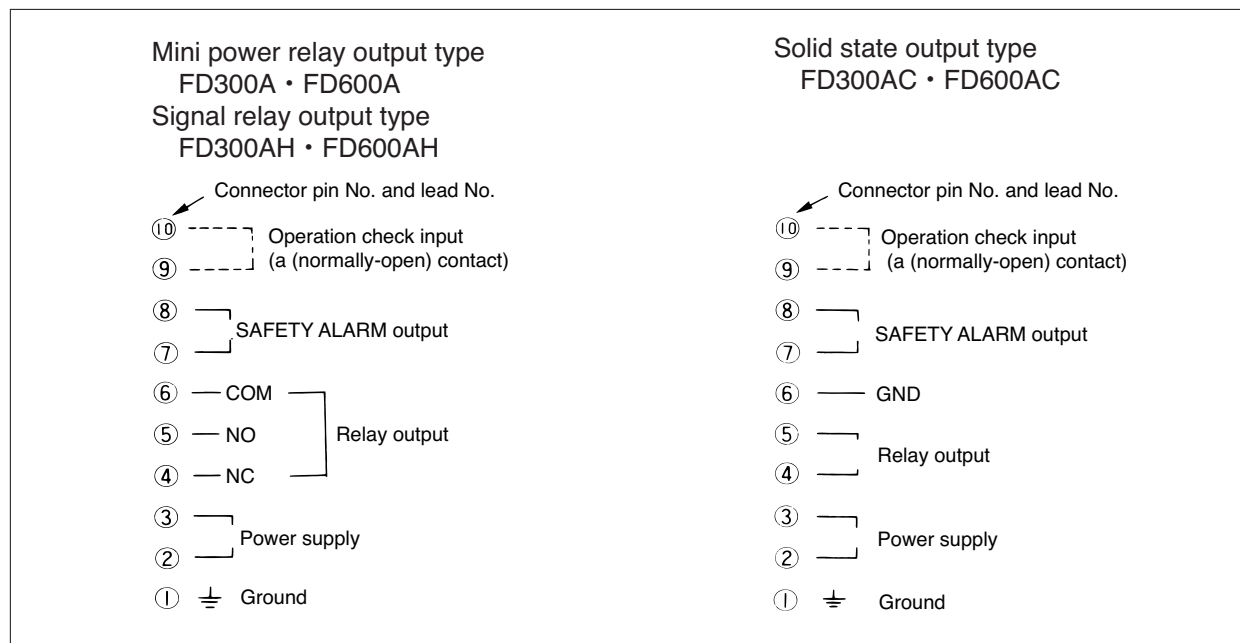
SAFETY ALARM operation : The number of checks is set at 7, which means that seven consecutive unstable detections activate the SAFETY ALARM output.

### Operation check

The simulated light source in the detector is illuminated by external check signal to activate the detector.

# FD300A · FD600A

## ■ Connection

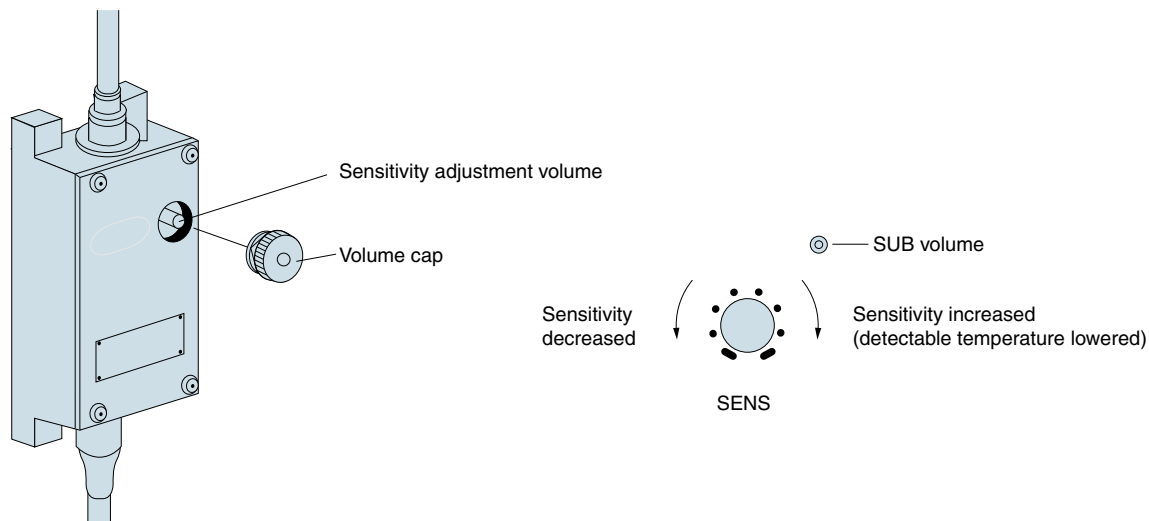


- When connecting an inductive load such as relay as the load, be sure to use diode, surge absorber, etc. for protection of output transistor from back electromotive force.

- When the leads are extended (100-300 m), stray capacitance between leads may cause rush current. If this poses any problem, provide a resistor (10-50 Ω) in series with the contact.
- Ground from frame  
Connect to the ground screw (M4) near the connector. You do not have to connect when already connected to the ground ① with a cable.

## ■ Sensitivity adjustment

Two volumes are provided for sensitivity adjustment: MAIN and SUB.



## ■ Optical Axis Alignment

Alignment with optical sight

Use the optical sight provided on the optical head.

Alignment with Optical axis aligner - Optical axis aligner is optionally available

See P. 551 for details.

# FD300A · FD600A

## Minimum Detectable Object and Lowest Detectable Temperature

The graphs below may be used to find the relationship between the diameter of a detection object and its lowest detectable temperature.

- The minimum detectable object diameter means the width of a round or square bar or board with a length equal to or more than the field of view that may be detected at any point in the field of view.
- Using graphs

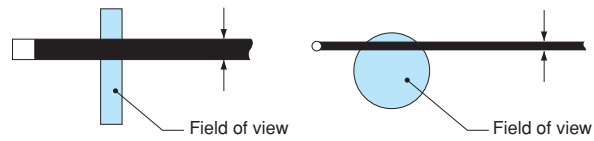
The graphs show data for a detecting distance of 1 m.

For example, if a combination of amplifier FD300A, optical head OHA and fiber optic cable FG10 are used for detecting a round bar of 10 mm, the lowest detectable temperature is 590 °C according to the first graph.

For a detecting distance other than 1 m, use the following procedure to find the "coefficient" and multiply the reading on the Y-axis of the graph (detection object diameter) by the resulting coefficient [K].

For detection with (OHW1/OHW2) used as optical head and detecting distance of 1 m or shorter. Example : If OHW1 is used and the detecting distance is 0.7 m, the coefficient is 0.7.

Multiply the Y-axis readings of the graph by 0.7 to complete the replaced Y-axis scale.



For detection with (OHA) used as optical head and detecting distance of 1 m or shorter

Coefficient  $K = L + (0.6 \cdot 0.6 \times L)$  (L = detecting distance (m))

Example : for detecting distance of 500 mm (L = 0.5)

$$K = 0.5 + (0.6 \cdot 0.6 \times 0.5) = 0.8$$

The coefficient is 0.8. Multiply this by Y-axis reading of the graph (detection object diameter) :  $50 \times 0.8 = 40$

This means that the point for detection object diameter 50 mm must be regarded as the point for diameter 40 mm.

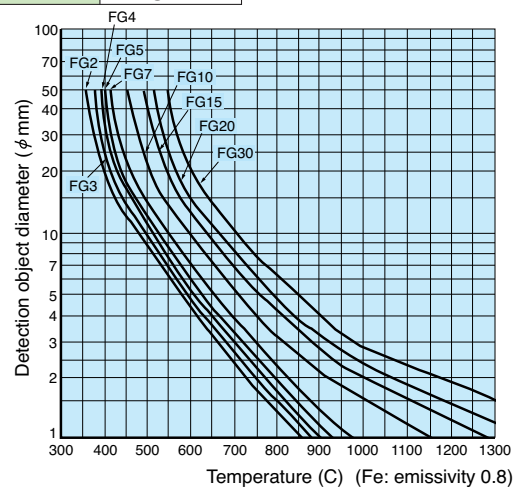
Multiply other values by the coefficient above in the same way and complete the replaced Y-axis scale.

For detecting distance of 1 m or longer (with any optical head model)

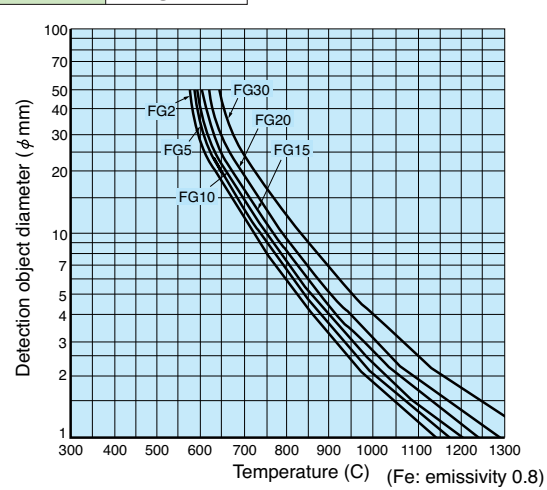
Use the distance as the coefficient.

Example: If the detecting distance is 2.5 m, the coefficient is 2.5. Multiply the Y-axis readings of the graph by 2.5 to complete the replaced Y-axis scale.

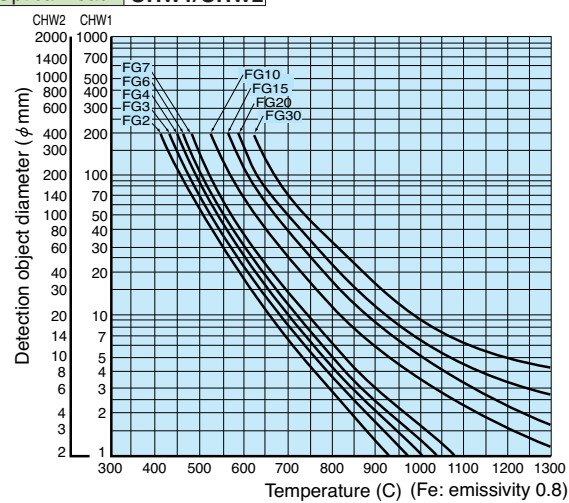
Amplifier	FD300A
Optical head	OHA



Amplifier	FD600A
Optical head	OHA



Amplifier	FD300A
Optical head	OHW1/OHW2



Amplifier	FD600A
Optical head	OHW1/OHW2

