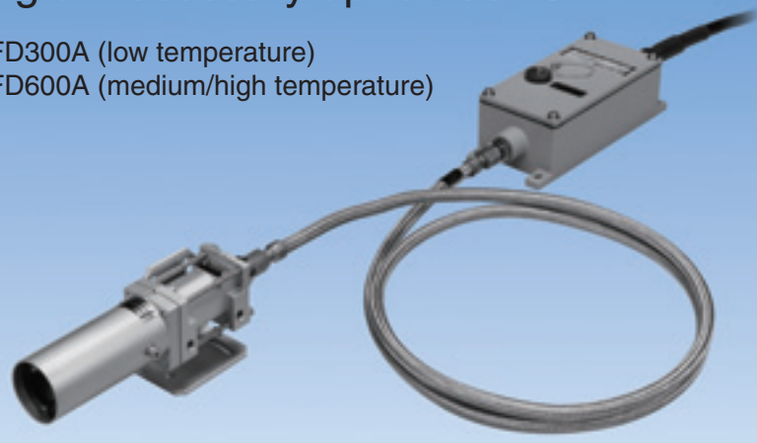
FD300/600A series

Fiber type / HMD

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

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



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, relay or Solid-state output).
Sensors for low temperature (FD300A Series) and medium/high temperature (FD600A Series) are available.

Features

- No cooling required
  The optical head integrating hood and optical lens and fiber 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.

Ordering Guide

The FD-300A/FD600A Series does not have set model Nos. Order by specifying the individual model Nos. of components. Models with marked with *compose a set shown on the previous page.

- Example

For ordering sensor with the following properties:

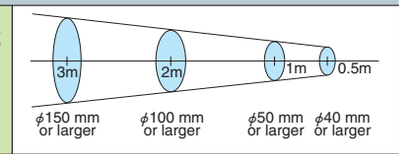
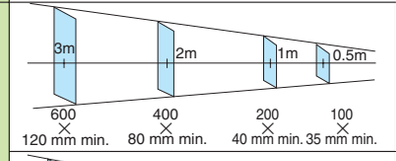
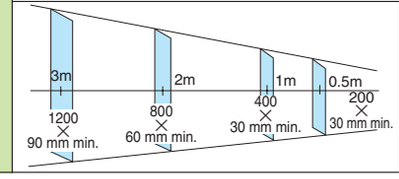
- Temperature of detection object: 600 °C or higher
- Mini power relay output
- Fiber length: 2 m
- Standard-view
- Compact, lightweight Airless hood

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 type 	**OHA※**
Wide type 	**OHW1**
Wide type 	**OHW2**

[Hood]

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

[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.491 for details

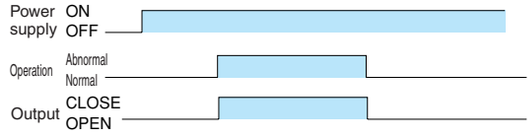
[Amplifier]

- 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	Wide			
Low temperature	2m	**FG2**	360 °C or higher	425 °C or higher	FD300A series	Mini power relay output	**FD300A※**
	3m	**FG3**	375 °C or higher	440 °C or higher			
	4m	**FG4**	385 °C or higher	460 °C or higher			
	5m	**FG5**	395 °C or higher	465 °C or higher		Reed relay output	**FD300AH**
	7m	**FG7**	415 °C or higher	485 °C or higher			
	10m	**FG10**	455 °C or higher	530 °C or higher			
	15m	**FG15**	490 °C or higher	570 °C or higher		Solid-state output	**FD300AC**
	20m	**FG20**	510 °C or higher	595 °C or higher			
	30m	**FG30**	540 °C or higher	625 °C or higher			
Medium/high temperature	2m	**FG2**	580 °C or higher	660 °C or higher	FD600A series	Mini power relay output	**FD600A**
	3m	**FG3**	580 °C or higher	660 °C or higher			
	4m	**FG4**	585 °C or higher	665 °C or higher			
	5m	**FG5**	585 °C or higher	670 °C or higher		Reed relay output	**FD600AH**
	7m	**FG7**	590 °C or higher	675 °C or higher			
	10m	**FG10**	595 °C or higher	680 °C or higher			
	15m	**FG15**	610 °C or higher	695 °C or higher		Solid-state output	**FD600AC**
	20m	**FG20**	620 °C or higher	710 °C or higher			
	30m	**FG30**	650 °C or higher	740 °C or higher			

FD300A·FD600A

Rating/Performance/Specification/Environmental Specification

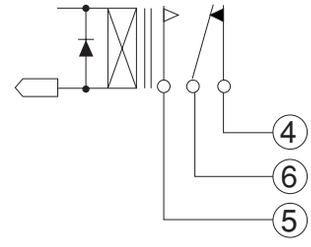
Output specification				
Model		**FD-300A FD-600A**	**FD300AH FD600AH**	**FD300AC FD600AC**
Output mode		Mini power relay output	Relay output	Solid-state output
Control output		On-OFF control (Light-ON)		
	Rating	Transfer contact MAX 5A 250V AC (Resistance load)	Transfer contact MAX 0.5A 48V DC (Resistance load)	MAX 0.5A 250V AC/DC (Resistance load)
	Response time	15ms max.	5mx max.	3ms max.
SAFETY ALARM output				
	Rating	a contact 5A 250V AC max. (Resistance load)		
General specification				
Valid lens diameter		28mm DIA (OHA)		
Power Supply		100 - 220VAC+10%, -15% 50/60Hz		
Power consumption		10W max.		
Connection		with Connector cable 2m (CVV1.25mm²)		
Ambient temperature		Optical head, Fiber: -25 to +200°C Amplifier: -25 +50°C (Non-freezing)		
Storage temperature range		-40 to +70°C (Non-condensing)		
Ambient humidity		35 to 85%RH Max. (Non-condensing)		
Fiber-optic unit allowable bending radius		50㎜		
Insulation resistance		Between power supply and case: 500 VDC, 20 MΩ or higher		
		Between output and case: 500 VDC, 20 MΩ or higher		
		Between power supply and output: 500 VDC, 20 MΩ or higher		
		Operation check input: omitted		
Dielectric withstanding		Between power supply and case: 1500VAC for 1 minute		
		Between output and case: 1500VAC for 1 minute Unless, Reed relay output: AC1000V for 1 minute		
		Between power supply and output: 1500VAC for 1 minute Unless, Reed relay output: AC1000V for 1 minute		
		Operation check input: omitted		
Vibration		10-55 Hz / 1.5 mm amplitude / 2 hours each in 3 direction		
Shock		500 m/s² / 3 times each in 3 directions		
Protective structure		IP66		
Weight	Optical head	Basic type (OHC): 680g Wide type (W1/W2): About 1300g		
	Airless hood	F38A : about 240g F38A-04 : about 550g F38W : about 600g	F38A-03 : about 430g F38A-05 : about 650g	
	Air purge hood	F38PC-02 : about 240g F38PC-04 : about 370g 302W : about 600g	F38PC-03 : about 300g F38PC-05 : about 440g	
	Fiber	FG2 : about 0.7kg FG5 : about 1.3kg FG15 : about 3.1kg	FG3 : about 0.9g FG7 : about 1.6g FG20 : about 4.1g	FG4 : about1.1kg FG10 : about2.1kg FG30 : about6.1kg
	Amplifier	About 1.5kg		

Input/Output Circuit and Connection

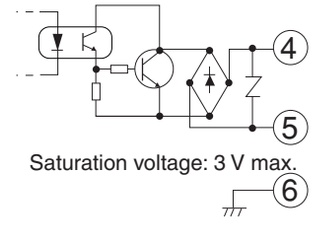
- Control output

Model FD300A・FD600A

Model FD300AH・FD600AH

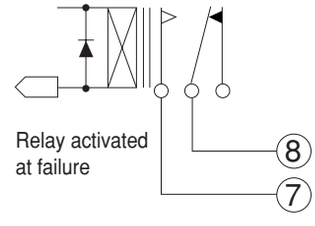


Model FD300AC・FD600AC



Saturation voltage: 3 V max.

- SAFETY ALARM output (all models)



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

Dimensions

The dimensions are the same with the FD-A300P Series.

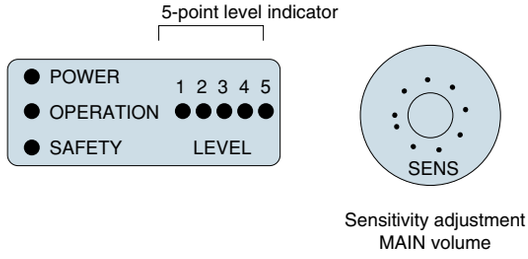
See PP. 480-481.

Configuration

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

See P. 475.

Amplifier panel layout (with case lid removed)



Illuminated at power-up.
Operation indicator: illuminated when control output is activated.
Stability check indicator (safety indicator)
When there is not much margin in the received light intensity, SAFETY ALARM is output and the LED starts flashing.
Received light intensity is shown with an indicator with 5 LEDs, which are illuminated differently for the individual levels:

LEVEL 1: 1/2 of operation level
LEVEL 2: operation level
LEVEL 3: double the operation level (±50% variable)
LEVEL 4: triple the operation level
LEVEL 5: quadruple the operation level

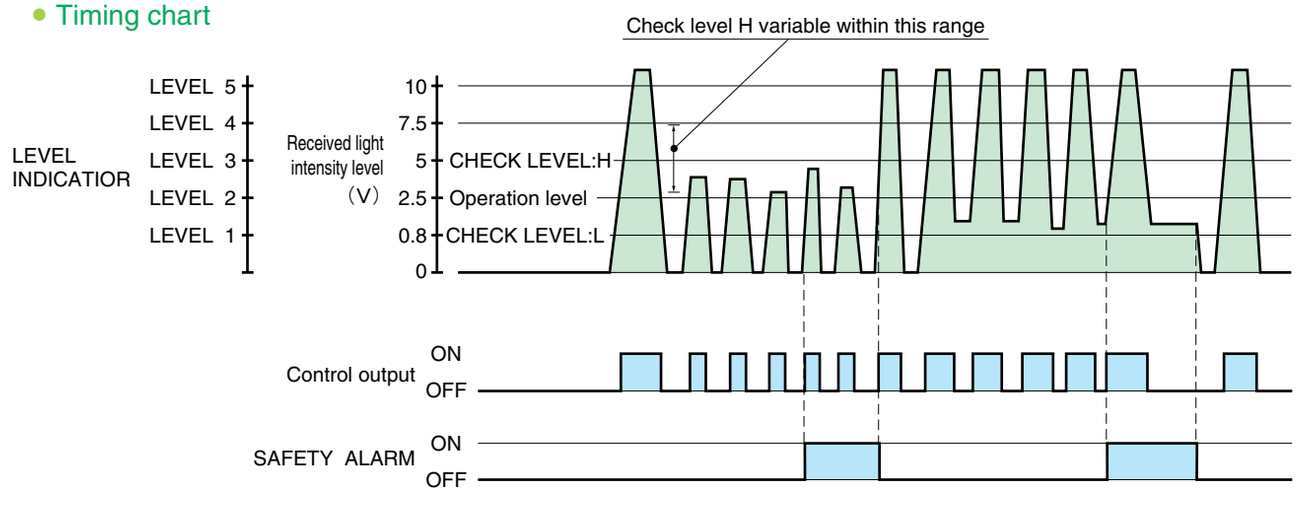
illuminated

Sensitivity adjustment
Two volumes are provided: MAIN and SUB. Only the MAIN volume can be manually operated from outside.

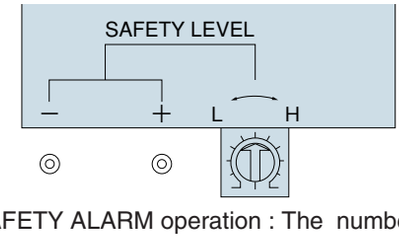
Control Output and Stability Check Feature

◇Control output: obtained by 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 operation level or intensity at light blocking state more than 1/2 of the operation level, a level error signal is output to notify of unstable detection.
This check level of ※double the operation level※ 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



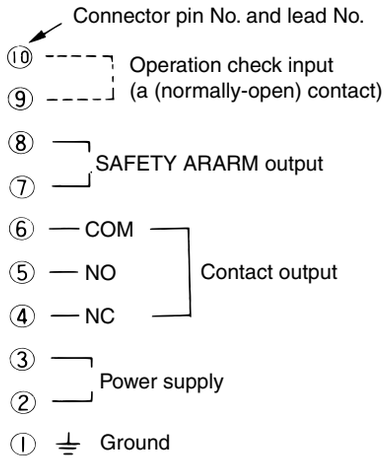
The volume is not provided on the surface.
Remove the case lid to access the volume for adjustment.

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.

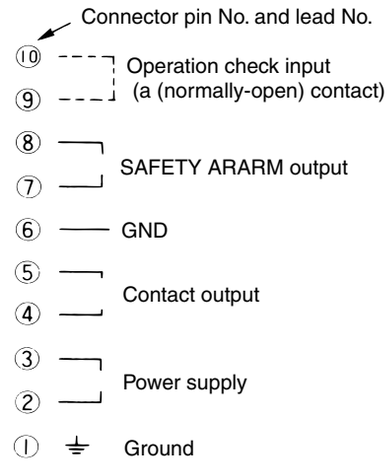
FD300A·FD600A

Connection

Mini power relay output type
FD300A・FD600A
Relay output type
FD300AH・FD600AH



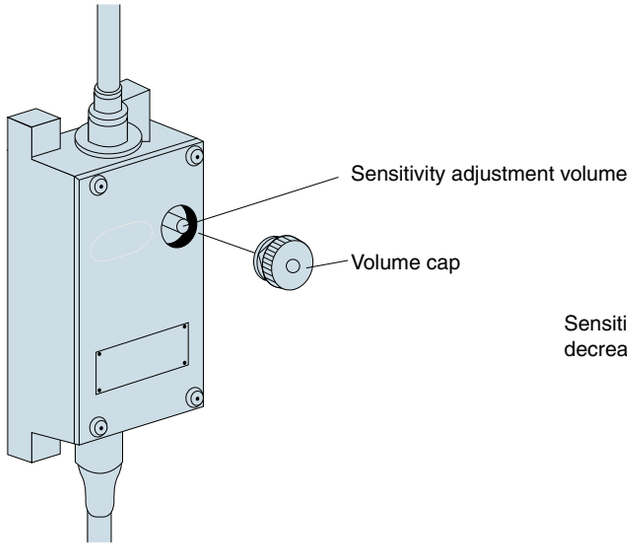
Solid-state output type
FD300AC・FD600AC

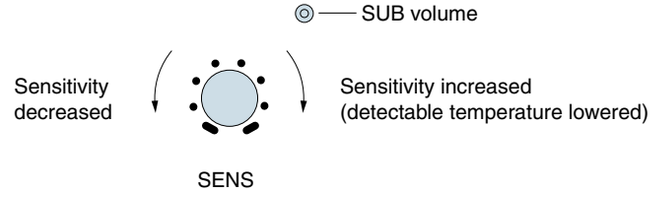


- When connecting an inductive load such as relay as the load, be sure to use diode, surge absorber, etc. for protection of output transistor from back electromotive force.
- When the leads are extended (100-300 m), stray capacitance between leads may cause rush current. If this poses any problem, provide a resistor (10-50 Ω) in series with the contact.

Sensitivity adjustment

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





Light Axis Alignment

Alignment with optical sight

Use the optical sight provided on the optical head.

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

See PP. 480 and 520 for details.

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.

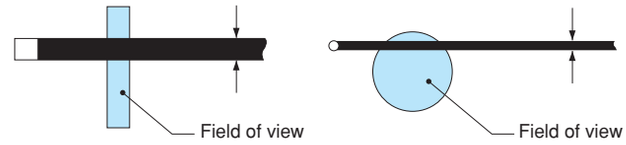
For example, if a combination of amplifier FD300A, optical head OHA and fiber optic cable FG10 are used for detecting a round bar of 10 mm, the lowest detectable temperature is 590 °C according to the first graph.

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 - 0.6 x L) (L = detecting distance (m))

Example : for detecting distance of 50 mm (L = 0.5)

K = 0.5 + (0.6 °0.6 x 0.5) = 0.8

The coefficient is 0.8. Multiply this by Y-axis reading of the graph (detection object diameter) : 50 x 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.

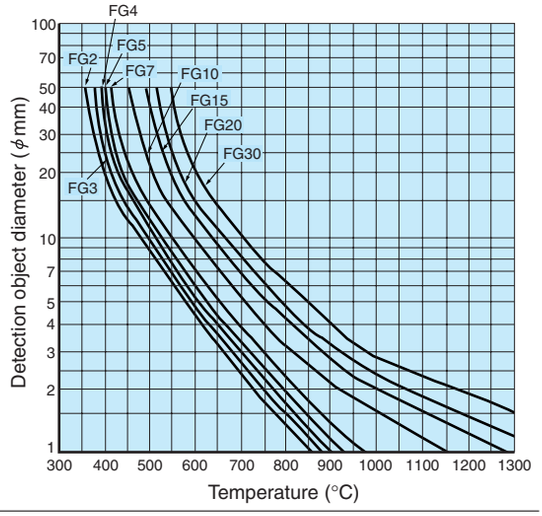
For detecting distance of 1 m or longer (with any optical head model)

Use the distance as the coefficient.

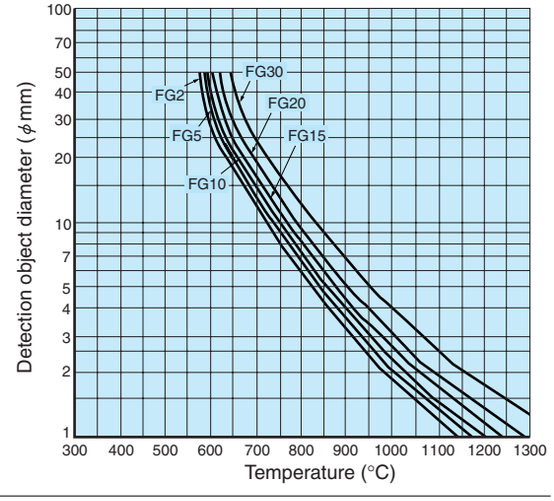
Example: If the detecting distance is 2.5 m, the coefficient is 2.5.

Multiply the Y-axis readings of the graph by 2.5 to complete the replaced Y-axis scale.

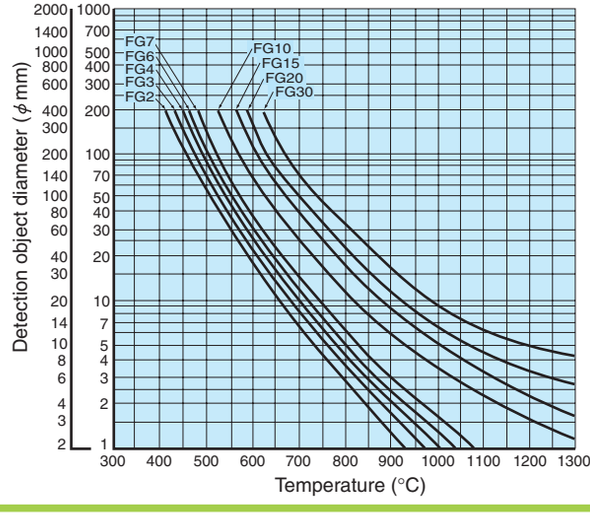
Amplifier	FD300A
Optical head	OHA



Amplifier	FD600A
Optical head	OHA



Amplifier	FD300A
Optical head	OHW1/OHW2



Amplifier	FD600A
Optical head	OHW1/OHW2